1.2.1
Percentage of new courses introduced of the total number of courses across all programs offered during the last five years

INDEX

A2 Regulations

(Curriculum, Course Structure and Syllabus of Courses in the order of)

B.Tech(Civil)

MAHARAJ VIJAYARAM GAPATHI RAJ COLLEGE OF ENGINEERING(AUTONOMOUS)
Vijayaram Nagar Campus, Chintalavalasa, Vizianagaram-535005, Andhra Pradesh
Accredited by NAAC with 'A' Grade & Listed u/s 2(f) & 12(B) of UGC
(Approved by AICTE, New Delhi and Permanently Affiliated by JNTUK-Kakinada)
NBA Accredited UG Courses: B.Tech(MEC), B.Tech(CIV), B.Tech(EEE), B.Tech(ECE), B.Tech(CSE), B.Tech(IT), B.Tech(MEC) & B.Tech(CHE) and PG Course: MBA

ACADEMIC REGULATIONS & CURRICULUM

Applicable to the students admitted from the Academic Year 2019-2020

CIVIL ENGINEERING

(B.Tech. Programme)

MAHARAJ VIJAYARAM GAJAPATHI RAJ COLLEGE OF ENGINEERING
(Autonomous)

(Approved by AICTE, New Delhi, and permanently affiliated to JNTUK, Kakinada)

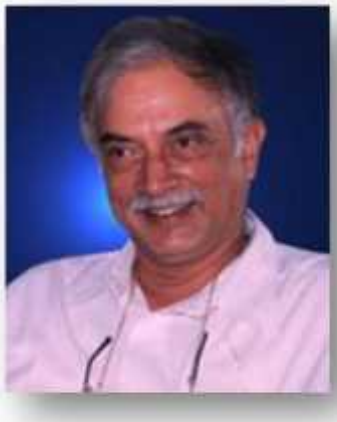
Listed u/s 2(f) & 12(B) of UGC Act 1956.

Vijayaram Nagar Campus, Chintalavalasa,Vizianagaram-535005, Andhra Pradesh

The visionaries

Late Dr. P V G Raju
Raja Saheb of Vizianagaram
Founder Chairman-MANSAS
Ex-Minister for Education and Health, Govt. of AP
Ex Member of Parliament

Late Dr. P. Anand Gajapathi Raju
Ex-Chairman-MANSAS
Ex-Minister for Education and Health
Govt. of AP
Ex Member of Parliament



P. Ashok Gajapathi Raju
Chairman-MANSAS
Ex-Union Minister for Civil Aviation,
Govt. of India
Ex-Minister for Finance, Govt. of AP

Vision

Maharaj Vijayaram Gajapathi Raj College of Engineering strives to become a centre par excellence for technical education where aspiring students can be transformed into skilled and well-rounded professionals with strong understanding of fundamentals, a flair for responsible innovation in engineering practical solutions applying the fundamentals, and confidence and poise to meet the challenges in their chosen professional spheres.

Mission

The management believes imparting quality education in an atmosphere that motivates learning as a social obligation which we owe to the students, their parents/guardians and society at large and hence the effort is to leave no stone unturned in providing the same with all sincerity. Towards that end, the management believes special focus has to be on the following areas:

M1: Have on-board staff with high quality experience and continuously updating themselves with latest research developments and sharing that knowledge with students.

M2: Having a well stream-lined teaching learning process that is continuously assessed for effectiveness and fine-tuned for improvement.

M3: Having state-of-the-art lab and general infrastructure that gives students the necessary tools and means to enhance their knowledge and understanding.

M4: Having a centralized department focused on improving placement opportunities for our students directly on campus and coordinating the training programs for students to complement the curriculum and enhance their career opportunities.

M5: Having advanced research facilities and more importantly atmosphere to encourage students to pursue self-learning on advanced topics and conduct research.

ABOUT THE INSTITUTION:

Maharajah Alak Narayan Society of Arts and Science (MANSAS) is an Educational Trust founded by Dr. (late) P.V.G Raju, Raja Saheb of Vizianagaram in the hallowed memory of his father Maharajah Alak Narayan Gajapati with a view to confound socio-economic inequalities in the Vizianagaram principality executing a trust deed on 12-11-1958 duly established Maharajah's College and other educational institutions in and around Vizianagaram. The Trust is a charitable one published under Section 6 a (1) of A.P Charitable and Hindu Religious Institutions and Endowment Act 30 of 1987.

The object of the Trust is to manage the properties of educational institutions under it and to promote and advance the cause of education in general, besides awarding scholarships to deserving students enabling them to undergo special training in science and industries in and out of India. The Trust has made an uncompromising contribution to the nation by presenting the stalwarts.

Trust offers KG to PhD level education in Arts, Sciences, Law, Pharmacy, Humanities Education, Engineering and Management and presently houses 13 Educational Institutions. MVGR College of Engineering is one of the 13 Institutes.

Other Institutions under MANSAS

1. M.R. HIGH SCHOOL 1857
2. M.R COLLEGE **(NAAC ACCREDITED)** 1879
3. M.R. COLLEGE OF EDUCATION 1950
4. M.R. WOMENS COLLEGE **(NAAC ACCREDITED)** 1962
5. M.R. GIRLS HIGH SCHOOL 1974
6. M.R. MODEL HIGH SCHOOL 1974
7. M.R. ENGLISH MEDIUM SCHOOL 1979
8. M.R.V.R.G.R LAW COLLEGE 1987
9. M.R. P.G. COLLEGE **(NAAC ACCREDITED)** 1987
10. M.R.SCHOOL OF MANAGEMENT STUDIES 1994
11. M.R.V.R.G.R – II MEMORIAL JR. COLLEGE 1994
12. M.R. COLLEGE OF PHARMACY 2004

Maharaj Vijayaram Gajapathi Raj (MVGR) College of Engineering was established in the year 1997 by Maharaj Alak Narayan Society for Arts and Sciences (MANSAS) to impart quality technical education. The Institution is located in lush green, serene and pollution free environment spread over 60 acres of land in Chintalavalasa village situated in the outskirts of Vizianagaram, a fort city in the north coastal region of Andhra Pradesh.

Institution at a glance:

- MVGR is a 22 years old institution, established in 1997
- All eligible UG Programs (CHEMICAL, CIV, CSE, ECE, EEE, IT & MECHANICAL) were reaccredited by NBA.
- MBA program was also re-accredited by NBA.
- Had been re-accredited with Grade 'A' by NAAC of UGC
- Has Permanent affiliation with JN Technological University-Kakinada
- Listed under sections 2(f) & 12(b) of UGC act 1956.
- Approved by AICTE-New Delhi
- EIGHT departments are recognized as RESEARCH CENTERS by JNTU-K
- Granted Autonomy by UGC in 2015
- Campus of 60 acre
- Offering 7 UG and 5 M.Tech., and 1 MBA program
- About 250 faculty of which 84 Ph.D. Degree holders
- 83 Laboratories with an investment of about 13 Crores
- Total built up area of about 7 Lakh Sft
- About 42,000 volumes and Access to 8 international online journal packages like IEEE, SPRINGER, etc.
- 1420 Systems & 395 Mbps band width internet facility
- About Rs. 4 Crore worth of on-going R&D projects
- Actively involved in civil engineering consultancy work as Third Party Quality Auditor for Vizianagaram Municipality
- WIPRO Recognized technology learning center and MISSION 10X partner institution
- Recognized National Instruments Academy for Training in LabView
- SIRO Recognition by DSIR
- Recognized PTC Centre of Excellence for Creo Training
- Identified by MSME as Business Incubation Centre
- APSSDC-Siemens Technical Skill Development Institute
- Recognized CMs SKILL EXCELLENCY CENTER (SEC)
- Microsoft Ed-vantage Platinum Partner
- Institutional member of IUCEE
- Institutional Member of CII
- Member, Chamber of Commerce, Vizianagaram
- Green Campus award by Govt. of AP

MVGR College of Engineering is rated as one among the best engineering colleges in the state of Andhra Pradesh as it set up highest standards in all areas of curricular, co-curricular and extra-curricular activities and in students' placements. Based on industry and expert's feedback, the college is updating the curriculum from time to time. The college offers many value added add-on courses students and conducts training programs to meet the industries' requirements.

Academic Regulations for B.Tech., Program

Applicable to the students admitted from the Academic year 2019-2020 onwards.

1. PROGRAM STRUCTURE:

B.Tech.:

Sl. No	Category	Credits
1	Humanities and Social Sciences including Management courses	12
2	Basic Science courses	25
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	26
4	Professional core courses	54
5	Professional Elective courses relevant to chosen specialization/branch	18
6	Open subjects – Electives from other technical and /or emerging subjects	12
7	Project work, seminar and internship in industry or elsewhere	13
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	0
	Total	160

- Open electives offered by the parent department are listed in the course structure and are offered to students of other programs. The students of parent departments may also opt the course, provided it shall not be listed in the curriculum.
- For audit course a student is deemed to satisfy the minimum contact hours, as prescribed by the department and shall also comply with the requirements for submission of assignments/projects. A student shall also opt for MOOCs and submit the certificate.

1. HSS Courses		
Sl. No.	Subject	Credits
1	English -1	3
2	English -2 (Technical English)	3
3	Elective-1 (Management Related course (MEFA or MS or Operations Research)	3
4	Elective-2 (Professional Ethics and Human Values)	3
	Total	**12**

2. Basic Science Courses		
Sl. No.	Subject	Credits
1	Mathematics-I	3
2	Mathematics-II	3
3	Mathematics-III	3
4	Mathematics-IV	3
5	Applied / Engineering Physics (Theory + Lab)	5
6	Engineering Chemistry (Theory + Lab)	5
7	Biology for Engineers	3
	Total	**25**

3. Engineering Science Courses		
Sl. No.	Subject	Credits
1	Programming for Problem Solving (Theory + Lab)	5
2	Internet of Things (IOT)	3
3	Computer aided Engineering Graphics	3
4	Basic Electrical Engineering (Theory + Lab)	5
5	Department wise Engineering Science Course-I (AI Tools , Techniques & Applications)	5
6	Department wise Engineering Science Course-II (Design thinking and Product Innovation)	3
7	Workshop (Department Specific)	**2**
	Total	**26**

	Subjects	Credits
4	**Professional Core Courses**	54
5	**Professional Elective Courses Relevant to Chosen Specialization/Branch**	18
6	**Open Subjects – Electives from other Technical and / or Emerging Subjects**	12
		84

7. Project		
Sl. No.	Subject	Credits
1	Socially Relevant Project	1
2	Mini Project	2
3	Project Phase - I	2
4	Project Phase - II	8
	Total	**13**

8. Audit Courses (Non Credit Course)		
Sl. No.	Subject	
1	Induction Program	
2	Constitution of India	
3	Indian Traditional Knowledge	
4	Environmental Science	

BOS Chairman shall notify the list of MOOCs offered (Open Elective & Professional Elective) in the beginning of the semester.

2. PROGRAM PATTERN:

B.Tech.: The program is for 4 academic years / 8 semesters.

B.Tech. (Lateral Entry): The program is for 3 academic years / 6 semesters.

3. AWARD OF DEGREE:

B.TECH:

A student will be declared eligible for the award of degree if he/she fulfills the following academic regulations.

a) A student shall be declared eligible for the award of degree, if he/she pursues a course of study for not less than four academic years and not more than eight academic years from the date of admission.

b) The student shall register for **160** credits and secure all **160** credits.

c) A student shall also register and successfully complete audit programs (Non-credit) as recommended by Academic Council.

d) A student on completing 1st year class work may opt for a break of 1 year which shall be deemed as GAP year, as recommended by APSCHE, for undertaking successful entrepreneurial ventures.

e) Students who fail to complete Four Years Course of study within 8 years shall forfeit their seat and their admission shall stand cancelled.

B.TECH (Lateral Entry):

A student will be declared eligible for the award of degree on fulfilling the following academic requirements.

a) A student shall be declared eligible for the award of the degree, if he/she pursues a course of study for not less than three academic years and not more than six academic years.

b) The student shall register for **126** credits and secure all **126** credits.

c) A student shall also register and successfully complete audit programs (Non-credit) as recommended by Academic Council.

d) Students who fail to complete their three Years Course of study within 6 years shall forfeit their seat and their admission shall stand cancelled.

e) Student shall register for bridge programs, if any, as administered by the respective departments at the beginning of 2nd year and successfully complete as per the guidelines of the Institution.

4. CERTIFICATION PROGRAMS:

Sl. No.	Dept.	Name of the Program
1	MECH	Windchill 10.2 PDM by Adroitec Engineering Solutions Pvt. Ltd., Hyderabad
2	MECH	Creo 2.0 by PTC
3	MECH	Edgecam by Verosoft, UK
4	MECH	ANSYS Training and Certification by Mechanical Department
5	MECH	AUTOCAD Training and Certification by Mechanical Department
6	MECH	Catia by APSSDC-Dassault Systems, CM's Center of Excellence
7	MECH	Delmia by APSSDC-Dassault Systems, CM's Center of Excellence
8	MECH	Simulia by APSSDC-Dassault Systems, CM's Center of Excellence
9	MECH	2-Wheeler Automobile Certification by APSSDC-SIEMENS
10	MECH	4-Wheeler Automobile Certification by APSSDC-SIEMENS
11	MECH	Welding Certification by APSSDC-SIEMENS
12	MECH	CNC Certification by APSSDC-SIEMENS
13	MECH	Commercial Electrical Certification by APSSDC-SIEMENS
14	MECH	Solid Edge Certification by APSSDC-SIEMENS
15	CHEM	Chemical Process Design and Simulation by Simtech Simulations, Hyderabad
16	ECE	Embedded Systems by Think LABS, Mumbai
17	ECE	Labview by National Instruments Systems India Pvt. Ltd.
18	ECE	Unified Technology Learning Program (UTLP) by Wipro Mission 10X
19	CSE, IT	PEGA by Virtusa Corporation
20	CSE, IT	Microsoft technologies by Microsoft Corp.
21	CSE, IT	Ethical Hacking by EC-Council Academia
22	CSE, IT	Java and C by Talent Sprint
23	CSE, IT	Network Analyst (CCNA) by Cisco Systems Inc
24	CSE, IT	Java Programming (OCJP) and DBMS by Oracle
25	EEE	PLC, Drives and Automation by Siemens
26	EEE	PLC by New Dawn Automation
27	EEE	Home Electrical Certification by APSSDC-SIEMENS
28	Civil	Remote Sensing and GIS by Indian Institute of Remote Sensing

a) The Institution shall offer the certification programs by itself or in collaboration with industry/such other Institutions deemed to have specialized expertise in the proposed area of training.
b) Only students of the Institution shall be eligible to register on payment of prescribed fee.
c) However, subject to availability of resources and the demand the Institution may offer the program to external candidates meeting the pre-qualification requirements and in the order of the merit.
d) The duration of the course and design of the content shall be done by the respective departments of the Institution by themselves or in collaboration with industry/such other institutions deemed to have specialized expertise in the proposed area of training.
e) If the duration of the course is less than or equal to 40 hours, it can be completed in one semester, otherwise, it can suitably distributed over a number of semesters.
f) Mere enrolment/registration for the program shall not entitle any claim for award of certificate.
g) A candidate shall be deemed eligible for the award of the certificate if he/she
   - Attends at least 75% of scheduled training sessions
   - Complies to all the requirements of submission of the assignments, presentations, seminars, projects, etc., and also appears for periodic tests.
   - Shall attain minimum levels of performance in tests as prescribed.
   - Shall remit such fee as deemed fit for the certification
   - A candidate registered and failed to meet the requirements shall be permitted to repeat the said training one another time after remitting 25% of the fee fixed for the program as re-registration fee.

If the student is absent for the periodic tests, the test shall be re-conducted on payment of 10% of fee.

5. COURSES OFFERED:

Name of the Program	Degree
UG Programs (Engineering & Technology)	B.Tech. (Civil) B.Tech. (EEE) B.Tech. (Mech.) B.Tech. (ECE) B.Tech. (CSE) B.Tech. (CHEM) B.Tech. (IT)
PG Programs (Engineering & Technology)	M.Tech. (Structural Engineering) M.Tech. (Power Systems) M.Tech. (PDM) M.Tech. (VLSI) M.Tech. (CN&IS)
Other PG Programs	MBA
Research Programs	Ph.D. in Civil, EEE, MECH, ECE, CSE, CHEM, MBA and MATHS

6. DISTRIBUTION AND WEIGHTAGE OF MARKS:

B.Tech.:

a). All Theory courses will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment:

Subjective tests	- 20 Marks
Objective tests	- 10 Marks
Assignments	- 10 Marks

- Two subjective tests shall be conducted.
- Each subjective test shall be conducted for 90 Minutes and have 3 questions each for 7 marks (No choice) and the same shall be scaled down to 20 Marks.
- Average of two subjective tests shall be considered.
- Two objective tests (online) shall be conducted each for 20 marks.
- Each objective test shall be conducted for 20 minutes and have 20 Multiple Choice Questions each for 1 mark and the same shall be scaled down to 10 Marks.
- Average of two objective tests shall be considered.
- Assignments shall be assessed for 10 marks.

External Assessment:

- External examination is for 60 marks (180 min). Question paper contains 10 questions (2 questions from each unit) and each question carries 12 marks. Student shall answer 5 questions (1 question from each unit).

b). **Laboratory/Practice:**

All Laboratory/Practice courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

- Continuous assessment for 15 marks for each experimental session finally averaged to 15 marks.
- Project based learning shall be assessed for 15 Marks.
- In Project based learning, a student has to identify a problem such that at least 3 or 4 modular learning of experiments shall be integrated and submit comprehensive report with solution at the end of the semester.
- An internal assessment test conducted at the end of the semester shall be assessed for 10 marks.

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Both internal and external examination shall include assessment of the student on
    a) Knowledge of principles/concepts involved
    b) Experimental design
    c) Result interpretation and analysis
    d) Experimental report

c). **Drawing/Design/Estimation:**

i) Computer Aided Engineering Graphics:

Evaluation Procedure:

The course will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Question paper contains 3 questions (with internal choice). **E**ach question carries 20 marks (5 marks for free hand drawing and list of commands & 15 marks for final drawing prepared in AUTOCAD). A Student shall answer all questions.

ii) Modeling and Assembly of Mechanical Elements:

Evaluation Procedure:

The course will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Semester End Examination shall include assessment of the student on Final drawings like modeling, assembly and drafting.
- Student is expected to execute one exercise.
- Final drawings like modeling, assembly and drafting hard copies shall be evaluated by both internal and external examiners

Integrated Course (Theory + Lab):

Theory and Lab shall be assessed for 200 Marks (Each 100 marks)

- For Integrated course, the theory shall be assessed for 100 marks, of which 40 marks for internal assessment and 60 marks for semester end external examination.
- The Lab shall be assessed for 100 marks , of which, 40 marks for internal assessment and 60 marks for semester end external examination

Socially Relevant Project:

- A student shall identify and provide a solution to the problem relevant to society/Profession/Industry.
- A student shall engage at least 15 hours on socially relevant project. Socially relevant project shall be evaluated internally for 50 marks by Project Review Committee (PRC). PRC comprising of HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide shall review the progress.

Mini Project:

- A student shall undergo internship for a period of 4 weeks/provide solution to the problem relevant to Industry/ Modern tool during the vacation after VI semester and submit comprehensive report.
  - Mini project shall be evaluated internally for 50 marks by Project Review Committee (PRC).
  - PRC shall prepare rubrics for assessment.

Project Evaluation:

Project is divided into 2 phases – Phase I & Phase II

- Evaluation shall comprise of internal and external assessment.
  Internal: 110 (Phase I 50 marks, Phase II 60 Marks)
  External: 90
- A project Review committee (PRC) comprising of HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide shall review the progress once in four weeks.

Project Phase I:

- Project Phase I shall be evaluated internally by PRC for 50 Marks.
- A student shall undertake project phase I during the VII semester.
- A student shall report to the guide/external supervisor and work under his supervision at least 2 hours per week.
- Assessment shall be on
  - Literature review
  - Identification and statement of the Problem

Project Phase II:

- A student shall undertake project phase II during the VIII semester.
- A student shall report to the guide/external supervisor and work under his supervision at least 8 hours per week.
- Internal evaluation shall be done by HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide for 60 marks.
- External evaluation shall be done by HoD, Guide/Internal Examiner and External Examiner for 90 marks.
- Assessment shall be on
  a) Review on fundamental knowledge involved
  b) Inter disciplinary aspect
  c) Experimental/methodology design
  d) Result analysis and interpretations
  e) Report writing
  f) Team work
  g) Presentation
  h) Viva-voce

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2^{nd}, 3^{rd} and 4^{th} years of study shall be same as applicable to regular B.Tech students.

7. ATTENDANCE REGULATIONS:

B.Tech.:

I. A student shall be eligible to appear for end semester examinations, if he or she acquires a minimum of 75% of attendance in aggregate of all the subjects (Theory & Lab.) for the semester.
II. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the college academic committee.
III. Shortage of attendance below 65% in aggregate of all the subjects (Theory & Lab) for the semester shall not be Condoned.
IV. Detained student shall seek re- admission for that semester when offered within 4 weeks from the date of commencement of class work.

PROMOTION RULE (Based on attendance):

- A Student shall be promoted to the next semester on fulfillment of minimum attendance requirement (75%) of current semester.

PROMOTION RULE (Based on credits):

- A student shall be promoted from IV semester to V semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to IV semester from the following examinations irrespective of whether the candidate takes the examination or not.
    - Two regular and Two supplementary examinations of I semester
    - Two regular and One supplementary examinations of II semester
    - One regular examination and One supplementary examination of III semester
    - One regular examination of IV semester.

- A student shall be promoted from VI semester to VII semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to IV semester from the following examinations irrespective of whether the candidate takes the examination or not.
    - Three regular and Three supplementary examinations of I semester
    - Three regular and Two supplementary examinations of II semester
    - Two regular and Two supplementary examinations of III semester
    - Two regular and One supplementary examinations of IV semester
    - One regular and One supplementary examination of V semester
    - One regular examination of VI semester.

B.TECH (Lateral Entry):

PROMOTION RULE (Based on attendance):

A Student shall be promoted to the next semester on fulfillment of minimum attendance requirement of current semester.

PROMOTION RULE (Based on credits):

A student shall be promoted from VI semester to VII semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to VI semester from the following examinations irrespective of whether the candidate takes the examination or not.

- Two regular and Two supplementary examinations of III semester
- Two regular and one supplementary examinations of IV semester
- One regular and One supplementary examinations of V semester
- One regular examination of VI semester.

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2nd, 3rd and 4th years of study shall be same as applicable to regular B.Tech students.

8. MINIMUM ACADEMIC REQUIREMENTS:

B.Tech.: (Theory/Lab)

i. A student is deemed to have satisfied the minimum academic requirements for a course on securing at least 24 marks out of 60 marks at semester end examination and overall minimum of 40 marks out of 100 marks including internal assessment.

ii. **Integrated Course (Theory + Lab):**

- The student shall secure minimum 24 marks out of 60 marks at semester end examination and overall 40 marks out of 100 marks for Theory and Laboratory courses independently. In case of failure in either theory or Laboratory course, the student should re-appear for both theory and laboratory.
- The assessment shall be done independently for both theory and laboratory courses and final marks shall be calculated on weighted average method for converting marks into grade points.

  Sample calculation:

  Integrated course-5 credits. Theory is for 3 credits and laboratory is for 2 credits.

  Total Marks obtained in theory: 70 out of 100 (3 Credits)

  Total Marks obtained in Lab : 90 out of 100 (2 Credits)

  Final marks of the integrated course is

  (70X3 + 90X2) / 5 = 78 Marks

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2nd, 3rd and 4th years of study shall be same as applicable to regular B.Tech students.

9. GRADING SYSTEM:

B.Tech. / B.Tech. (Lateral Entry)

Semester Grade Point Average (SGPA) for the current semester which is calculated on the basis of grade points obtained in all courses, except audit courses and courses in which satisfactory or course continuation has been awarded,

SGPA= Σ (course credits earned x Grade points) /
Σ (Total course credits in the semester.

CGPA= Σ (course credits earned x Grade points) up to successfully completed semesters / Σ (Total course credits up to successfully completed.

The UGC recommends a 10-point grading system with the following letter grades as

given below:

O	(Outstanding)	10
A+	(Excellent)	9
A	(Very Good)	8
B+	(Good)	7
B	(Above Average)	6
C	(Average)	5
P	(Pass)	4
F	(Fail)	0
Ab	(Absent)	0

- iii. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X10 = 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			**139**

Thus, **SGPA** =139/20 = 6.95

Illustration for CGPA

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
Credits: 16	Credits: 18	Credits: 25	Credits: 21	Credits: 23	Credits: 22
SGPA: 7.9	SGPA: 7.8	SGPA: 7.6	SGPA: 8.0	SGPA: 8.3	SGPA: 8.6

Semester 7	Semester 8
Credits: 21	Credits:14
SGPA: 8.2	SGPA: 8.5

Thus,

CGPA= $\frac{16x7.9 + 18x7.8 + 25x7.6 + 21x8.0 + 23x8.3 + 22x8.6 + 21x8.2 + 14x8.5}{160}$ = **8.1**

10. ELIGIBILITY FOR AWARD OF DEGREE:

B.Tech:

A student shall be eligible for award of the degree if he/she fulfills the following conditions:

1) Successfully completes all the courses prescribed for the Program.
2) CGPA greater than or equal to 4.5(Minimum requirement for Pass),

11. AWARD OF CLASS:

B.Tech:

Eligible Candidates for the award of B.Tech., Degree shall be placed in one of the following Classes based on CGPA.

Class	CGPA
Distinction	≥ 7.5
First Class	≥ 6.5
Second Class	≥ 5.5
Pass class	≥ 4.5

12. INSTRUCTION DAYS:

A semester shall have a minimum of 90 clear instruction days (including internal examinations).

13. Transfers from other Institutions shall not be permitted.

14. SUPPLEMENTARY EXAMINATIONS:

Supplementary examinations shall be conducted within 4 weeks from the date of announcement of results of regular examinations.

15. WITHHOLDING OF RESULTS: The result of a student shall be withheld

- If the student has not paid the dues, if any, to the institution
- If any case of pending disciplinary action ,
- Involvement in any sort of malpractices etc.
- Involvement in ragging.

16. TRANSITORY REGULATIONS:

A Candidate shall be readmitted from University regulations to A1 regulations or from A1 regulations to A2 regulations as per the guide lines of JNTUK.

17. AMENDMENTS TO REGULATIONS:

The Academic Council of MVGR College of Engineering (Autonomous) reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations, and/ or Syllabi or any other such matter relating to the requirements of the program which are compatible to the contemporary/emerging trends effectively meeting the needs of society/industry/stake holding groups.

18. Regulations for MALPRACTICES during the conduct of examinations

	Nature of Malpractices/Improper conduct	Punishment
1 (a)	If the candidate possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only. *
(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. *

2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled. *
3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider/candidate not on rolls, he will be handed over to the police and a case is registered against him. *
4	If the candidate mishandles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. Also if the answer script is mutilated / damaged disturbing the shape, of the script, answers, the bar code intentionally.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. He shall be debarred from class work and all examinations and be allowed to reregistered for the next subsequent odd or even semester only. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.*

5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	The same should be brought to the notice of CE who in turn in consultation with malpractice committee makes decision for cancellation of the performance in that subject. *
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. *
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. *
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. *

9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. *
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. *
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.*

*

19. General :

- Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
- The academic regulation should be read as a whole for the purpose of any interpretation.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

* * *

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

- Ragging within or outside any educational institution is prohibited.
- Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	 2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	 10 Months	+	Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE MVGR A RAGGING FREE CAMPUS

Ragging

ABSOLUTELY NO TO RAGGING

1. **Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.**
2. **Ragging entails heavy fines and/or imprisonment.**
3. **Ragging invokes suspension and dismissal from the College.**
4. **Outsiders are prohibited from entering the College and Hostel without permission.**
5. **Girl students must be in their hostel rooms by 7.00 p.m.**
6. **All the students must carry their Identity Cards and show them when demanded**
7. **The Principal and the Wardens may visit the Hostels and inspect the rooms any time.**

PROGRAM STRUCTURE

B.TECH (CIVIL ENGINEERING)

SEMESTER - I						
S. No	Course Code	Course Title	L	T	P	Credits
1	A2MAT101	Mathematics-I	3	-	-	3
2	A2CYI101	Engineering Chemistry (Theory + Lab)	3	-	3	5
3	A2EEI201	Basic Electrical Engineering (Theory + Lab)	3	-	3	5
4	A2CEW201	Workshop	-	-	4	2
5	A2EHA701	Constitution of India	2	-	-	0
Total Number of Credits						**15**

SEMESTER - II						
S. No	Course Code	Course Title	L	T	P	Credits
1	A2MAT102	Mathematics-II	3	-	-	3
2	A2PYI101	Engineering Physics (Theory + Lab)	3	-	3	5
3	A2CII201	Programming for Problem Solving (Theory + Lab)	3	-	3	5
4	A2MED201	Computer Aided Engineering Graphics	1	-	4	3
5	A2EHL001	English-I	1	-	3	3
Total Number of Credits						**19**

SEMESTER - III						
S. No	Course Code	Course Title	L	T	P	Credits
1	A2EHL002	English-II (Technical English)	2	-	2	3
2	A2MAT106	Mathematics-III	3	-	-	3
3	A2CEI201	AI Tools, Techniques & Applications	2	-	3	5
4	A2CET201	Internet of Things (IOT)	2	-	2	3
5	A2CET301	Engineering Mechanics	3	-	-	3
6	A2CEI301	Fluid Mechanics	3	-	3	4.5
7	A2CEI302	Surveying & Geometrics	2	-	2	3
8	A2EHA701	Environmental Science	2	-	-	0
Total Number of Credits						**24.5**

SEMESTER - IV						
S. No	Course Code	Course Title	L	T	P	Credits
1	A2MAT110	Mathematics-IV	3	-	-	3
2	A2XXT1XX	Biology for Engineers	3	-	-	3
3	A2CET202	Design Thinking and Product Innovation	2	-	2	3
4	A2CEL301	Computer Aided Civil Engineering Drawing	-	-	3	1.5
5	A2CEI303	Strength of Materials	3	-	3	4.5
6	A2CET302	Project Planning and Management	2	-	-	2
7	A2CEI304	Material Testing and Evaluation	3	-	3	4.5
8	A2EHA702	Indian Traditional Knowledge	2	-	-	0
Total Number of Credits						**21.5**

SEMESTER - V						
S. No	Course Code	Course Title	L	T	P	Credits
1	A2CEI305	Structural Analysis (Including STAAD. Pro.)	3	-	2	4
2	A2CEI306	Soil Mechanics	3	-	3	4.5
3	A2CET303	Basic Reinforced Concrete Design	3	-	-	3
4	 A2CET401 A2CET402 A2CET403 A2CET404 A2CET405	**Professional Elective-1** Advanced Concrete Technology Channels and River hydraulics Civil Infrastructure for Smart City Development Advanced Surveying MOOCs	3	-	-	3
5	A2CET501	Open Elective – I /MOOCs	3	-	-	3
6	A2CET502	Open Elective – II/MOOCs	3	-	-	3
7	A2CEP602	Mini Project	-	-	-	2
Total Number of Credits						**22.5**

SEMESTER - VI						
S. No	Course Code	Course Title	L	T	P	Credits
1	A2MST001	Managerial Economics & Financial Analysis	3	-	-	3
2	A2CEI307	Environmental Engineering	3	-	3	4.5
3	A2CET304	Design of Steel Structures	3	-	-	3
4	A2CET305	Highway Engineering	3	-	-	3
5	A2CET306	Irrigation and Water Resources Engineering	3	-	-	3
6	 A2CET406 A2CET407 A2CET408 A2CET409 A2CET410	**Professional Elective-II** Repair and Rehabilitation of Structures Remote Sensing and GIS Reinforced Soil Structures Engineering Geology MOOCs	3	-	-	3

7	A2CET411 A2CET412 A2CET413 A2CET414 A2CET415	**Professional Elective-III** Advanced Reinforced Concrete Design Ground Improvement Techniques Advanced Fluid Mechanics Disaster Management MOOCs	3	-	-	3
Total Number of Credits						**22.5**

SEMESTER - VII						
S. No	Course Code	Course Title	L	T	P	Credits
1	A2EHT001	Professional Ethics and Human Values	3	-	-	3
2	A2CET307	Estimation & Costing	3	-	-	3
3	A2CET308	Foundation Engineering	3	-	-	3
4	A2CET416 A2CET417 A2CET418 A2CET419 A2CET420	**Professional Elective – IV** Matrix Methods of Structural Analysis Air pollution Engineering Railways, Airports and Harbours Advanced Environmental Engineering MOOCs	3	-	-	3
5	A2CET421 A2CET422 A2CET423 A2CET424 A2CET425	**Professional Elective - V** Environmental Impact Assessment Environmental Economics Traffic Engineering and Transport Planning Ground Water Development and Management MOOCs	3	-	-	3
6	A2CET426 A2CET427 A2CET428 A2CET429 A2CET430	**Professional Elective – VI** Finite Element Method Building Construction and Services Water Resource System Planning and Management Advanced Water Resources Engineering MOOCs	3	-	-	3
7	A2CEP601	Socially Relevant Project	-	-	2	1
8	A2CEP603	Project Phase - I	-	-	4	2
Total Number of Credits						**21**

SEMESTER - VIII						
S. No	Course Code	Course Title	L	T	P	Credits
1	A2CET503	Open Elective – III/ MOOCs	3	-	-	3
2	A2CET504	Open Elective – IV / MOOCs	3	-	-	3
3	A2CEP604	Project Phase - II	-	-	16	8
Total Number of Credits						**14**

PROFESSIONAL ELECTIVE COURSES OFFERED BY THE DEPARTMENT OF CIVIL ENGINERING

Professional Elective-1	Professional Elective -2	Professional Elective -3	Professional Elective -4	Professional Elective -5	Professional Elective -6
Advanced Concrete Technology	Repair and rehabilitation of structures	Advanced Reinforced Concrete Design	Matrix Methods of Structural Analysis	Environmental Impact Assessment	Finite Element Method
Channels and River hydraulics	Remote sensing and GIS	Ground improvement techniques	Air pollution Engineering	Environmental Economics	Building construction and services
Civil infrastructure for smart city development	Reinforced soil structures	Advanced Fluid mechanics	Railways, Airports and Harbours	Traffic Engineering and Transport Planning	Water resource system planning and management
Advanced surveying	Engineering Geology	Disaster Management	Advanced Environmental Engineering	Ground Water Development and Management	Advanced water resources Engineering

OPEN ELECTIVE COURSES OFFERED BY THE DEPARTMENT OF CIVIL ENGINEERING

1. Remote sensing and GIS
2. Project Planning and Management
3. Road safety Engineering
4. Geomatics
5. Building services
6. Water Power Engineering
7. Solid waste management
8. Technology in Rural development

A2MAT101	SEMESTER - I	L	T	P	C
	MATHEMATICS-I (common to ALL branches)	3	0	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: LINEAR ALGEBRA-1

Rank of a matrix: Elementary row and column transformations, equivalent matrices, Echelon form of a matrix, calculation of rank by reducing the matrix to Echelon form. System of equations: Linear system of equations, homogeneous and non-homogeneous system of equations, consistency criteria, trivial and non-trivial solutions, solving system of equations by Rank method; Eigenvalues and Eigenvectors: Finding Eigenvalues and Eigenvectors, properties of Eigenvalues and Eigenvectors (statements) including spectral mapping theorem.

UNIT- II: LINEAR ALGEBRA-2

Cayley-Hamilton Theorem: Statement of the theorem and its verification. Applications: Finding higher powers of a matrix, finding matrix polynomials, finding inverse of matrix. Diagonal form of a matrix: Reduction to diagonal form, spectral and modal matrices, finding higher powers of a matrix using diagonalisation, Quadratic forms: Matrix form of quadratic forms, orthogonal transformation, canonical form, reduction of quadratic form to canonical form by orthogonal transformation method, rank, index, signature and nature (definiteness) of a quadratic form.

UNIT-III: FIRST ORDER DIFFERENTIAL EQUATIONS & APPLICATIONS

Outlines: Differential Equations(DEs), Order and degree of a DE, Formation of DEs, general solutions of a DE; Solving first order and first degree DEs: linear DEs, Bernoulli's DEs (reducible to linear), exact DEs, integrating factors, non-exact DEs (reducible to exact).

Applications to real world problems: Newton's law of cooling, laws of growth and decay, family of curves, orthogonality of families curves, orthogonal trajectories (Cartesian and polar curves).

UNIT-IV: HIGHER ORDER DIFFERENTIAL EQUATIONS

Differential equations of higher order: Linear differential equations of higher order, its operator form. Solution concepts: General (complete) solution, particular solution. Solution of linear differential equations of higher order: Auxiliary equations, rules for finding complementary functions, rules for finding particular integrals (general and special methods).

UNIT-V: LAPLACE TRANSFORMS

Laplace transformation: Laplace transformation of elementary functions, Properties: Linearity, change of scale, first shifting properties, finding Laplace transformations using properties, Advanced properties: Laplace transformations of derivatives and integrals, multiplication by t^n, division by t (statements), finding Laplace transformations

using advanced properties; Inverse Laplace transformations: Finding inverse Laplace transformations using partial fractions, statement of Convolution theorem, finding inverse Laplace transformations by Convolution theorem; Applications: Solving Initial Value Problems by using Laplace transformations.

//Topics prefixed with 'outlines / overview' are not for assessment//

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017
2. T.K.V. Iyengar et al, Engineering Mathematics, S. Chand Publishers, Revised edition

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010
3. T. Veerarajan, Higher Engineering Mathematics, Tata McGraw-Hill, 2008

COURSE OUTCOMES: Learners at the end of this course will be able to

CO 1	KO#1	Recall the concepts of Linear algebra
CO 2	KO#2	Recall the solution methods and applicability of first order differential equations
CO 3	KO#3	Recall the solution methods of higher order differential equations and the concepts of Laplace transforms
CO 4	UO#1	Use and interpret the concepts of linear algebra
CO 5	UO#2	Use and interpret solution methods and applicability of first order differential equations
CO 6	UO#3	Use and interpret solution methods of higher order differential equations and the concepts of Laplace transforms
CO 7	AO#1	Apply the concepts of linear algebra, differential equations and Laplace transformation to model and solve real world problems

CO/PO Mapping

Course Title:	Mathematics-I (Common to ALL Branches)													
Course Code:	A2MAT101													
Course Designed by	Dept. of Mathematics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2							2			
CO2	3	3		2							2			
CO3	3	3		2							2			
CO4	3	3		2							2			
CO5	3	3		2							2			
CO6	3	3		2							2			
CO7	3	3		2							2			

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 06.07.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CYI101	SEMESTER - I	L	T	P	C
	ENGINEERING CHEMISTRY (Common to all branches)	3	--	2	5
	Total Contact Hours – 48				

SYLLABUS

UNIT 1: WATER TECHNOLOGY

Introduction –Soft Water and hardness of water, Estimation of hardness by EDTA Method - Boiler troubles - Industrial water treatment – specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, zeolite and ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.

UNIT 2: POLYMERS

Introduction to polymers, functionality of monomers, addition and condensation polymerization, copolymerization, stereospecific polymerization with specific examples. Thermoplastics and Thermo-sets – their differences.

Elastomers – applications with specific examples- Preparation, properties and uses of PVC, Bakelite, Teflon and Nylon-6, 6, Buna-S and Thiokol rubber- Fibre reinforced plastics – carbon fibre, glass fibre and aramids.

UNIT 3: ELECTROCHEMISTRY AND APPLICATIONS

Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations.
Primary cells –dry cell- Secondary cells – lead acid, nickel-cadmium and lithium ion batteries- working of the batteries including cell reactions- Fuel cells, hydrogen-oxygen, and methanol fuel cells – working of the cells.
Corrosion: Introduction to corrosion, mechanism of dry and wet corrosion, Pilling Bedworth ratios and uses, Types of corrosion – Differential aeration corrosion, galvanic corrosion, pitting corrosion, waterline corrosion and stress corrosion, Factors affecting the rate of corrosion – metal based factors and environmental based factors, protection techniques – metal coatings – galvanization and tinning, cathodic protection, inhibitors – cathodic and anodic, organic coatings – paints – constituents and their functions.

UNIT-4: CHEMISTRY OF ADVANCED MATERIALS

NANOMATERIALS: introduction- synthesis of Nano material by sol gel method- CVD- engineering applications of Nano materials

CEMENT: Introduction to ordinary Portland cement- manufacturing of OPC- setting and hardening of cement- decay of cement.

FUELS: Introduction- classification- liquid fuels- cracking- knocking- octane number and cetane number; Lubricants- definition- mechanism and properties of lubricants

UNIT 5: INSTRUMENTAL METHODS AND APPLICATIONS

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle, instrumentation (Block diagram and working), applications of UV, IR and NMR spectroscopic methods. Chromatography- introduction- Ion exchange chromatography- applications

COURSE OUTCOMES:

CO1: The student will have the ability to describe softening methods and desalination processes. He/ She will be able to explain various types of polymers; preparation, properties and engineering applications of thermoplastic, thermosetting plastics, rubbers and FRP's.

CO2: The student will have the ability to describe electrochemical reactions, principles of batteries, fuel cell and corrosion.

CO3: The student will have the ability to outline electromagnetic spectrum and explain the working principles of IR, UV, NMR and chromatographic techniques. The student describes the synthesis, properties and applications of nanomaterials, cement. HE/ She Outlines the cracking methods, knocking of fuels.

CO4: The student will have the ability to differentiate between hard and soft water, demineralization and deionization processes and thermosetting – thermoplastic materials.

CO5: The students will have the ability to give examples on primary and secondary batteries, various types of corrosion, methods of corrosion prevention.

CO6: The student will have the ability to draw inferences on the principles and applications of various instrumental methods and also can compare and contrast between cracking methods.

CO7: The student will have the ability to analyze water samples and validate the results obtained and apply their knowledge on polymers, batteries, materials and instrumentation.

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

Reference books:

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. H.Kaur, Instrumental Methods of chemical analysis, Pragathi Prakashan, 2012.
3. Chemistry for Engineers, Teh Fu Yen, Imperial college press, London

CO/PO Mapping

Course Title:	Engineering Chemistry													
Course Code:	A2CYI101													
Course Designed by	Dept. of Chemistry													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								2			1		
CO2	3								2			1		
CO3	3								2			1		
CO4	3								2			1		
CO5	3								2			1		
CO6	3								2			1		
CO7	3								2			1		

Course designed by	DEPARTMENT OF CHEMISTRY
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

Engineering Chemistry - Laboratory

List of Experiments:

1. Determination of HCl using sodium carbonate
2. Determination of Hardness of a groundwater sample.
3. pH metric titration of strong acid vs. strong base
4. Condcutometric titration of Strong acid VS Strong base
5. Condcutometric titration of Weak acid VS strong base
6. Potentiometric titration of Fe(II) with potassium dichromate
7. Determination of Strength of an acid in Pb-Acid battery
8. Preparation of a polymer
9. Determination of viscosity of polymer solution using survismeter
10. Determination of percentage of Iron in Cement sample by colorimetry
11. Estimation of Calcium oxide in port land Cement
12. Preparation of Nanomaterials (ex: Fe/ Zn/ Ferrite)
13. Adsorption of acetic acid by charcoal
14. Determination of acid value and saponification value of a given lubricant
15. Project based learning (Mandatory for all students)

Course Outcomes:

CO1: The student will be able to determine total hardness, strength of acid in a lead acid battery, calcium in Portland cement using volumetric analysis

CO2: The student will be able to explain condcutometric, potentiometric, pH metric titrations and colorimetric determination.

CO3: The student will be able to explain the synthesis of a polymer, nanomaterials

CO/PO Mapping

Course Title:	Engineering Chemistry													
Course Code:	A2CYI101													
Course Designed by	Dept. of Chemistry													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		1			1				1	1	2		
CO2	3		1			1				1	1	1		
CO3	3		1							1	1	1		

Course designed by	DEPARTMENT OF CHEMISTRY
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2EEI201	SEMESTER – I	L	T	P	C
	Basic Electrical Engineering (Common to all branches)	3	1	2	5
	Total Contact Hours – 50				

SYLLABUS

UNIT 1: D.C. CIRCUITS

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, Analysis of simple circuits with DC excitation, Superposition, Thevenin's and Norton's Theorems, Time-domain analysis of first-order RL and RC circuits.

UNIT 2: A.C. CIRCUITS

Representation of sinusoidal waveforms, Average and RMS values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase AC circuits (Series & Parallel), Resonance, Three-phase balanced circuits, voltage and current relations in star and delta configurations.

UNIT 3: DC & AC MACHINES [ELEMENTARY TREATMENT ONLY]

Principle and operation of DC Generator - EMF equation – open circuit characteristic of DC shunt generator – principle and operation of DC Motor – Types of DC Motors – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of single-phase Transformer - OC and SC tests on transformer - principle and operation of single phase & Three phase Induction Motors, construction and working of synchronous motors

UNIT 4: BASICS OF POWER SYSTEMS:

Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.

UNIT 5: ELECTRICAL INSTALLATIONS

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Types of Batteries, Characteristics of Batteries. Elementary calculations for energy consumption, power factor improvement, battery backup.

TEXT BOOK/ REFERENCES:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010
2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
3. Vincent Del Toro, "Electrical Engineering Fundamentals", Pearson, 2015.

COURSE OUTCOMES:

At the end of the course, Student will be able to

CO1. To recall fundamental concepts of electrical circuits such as charge, voltage, current and power.
CO2. Describe the principle of operation of D.C. & A.C. machines.
CO3. Outline the working operation of various generating stations.
CO4. Explain the procedure for solving circuits with A.C and D.C. Excitation
CO5. Summarize the performance characteristics of different machines.
CO6. Explain about different equipment used in power industry
CO7. Apply the fundamental laws, associated with Basic Electrical Engineering to solve real world problems in the field of Engineering

CO/PO Mapping

CO / PO mapping	Program Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
To recall fundamental concepts of electrical circuits such as charge, voltage, current and power.	3	3	1	1			3			1			1	1
Describe the principle of operation of D.C. & A.C. machines.	3	2	2	2	2					1			1	1
Outline the working operation of various generating stations.	3	3	3	1	1		1			1			1	1
Explain the procedure for solving circuits with A.C and D.C. Excitation	3	3	2	1	1		2			1			1	1
Summarize the performance characteristics of different machines.	3	3	2	1	1	3	1			1			1	1
Explain about different equipment used in power industry	3	3	2	1		2	2			1		1	3	2
Apply the fundamental laws, associated with Basic Electrical Engineering to solve real world problems in the field of Engineering	3	3	3	3	3	2	2			2		3	3	3

Course designed by	Department of Electrical & Electronics Engineering
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

Basic Electrical Engineering Laboratory

LIST OF EXPERIMENTS

Basic safety precautions, Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope, resistors, capacitors and inductors.

1. Verification of Kirchhoff laws.
2. Verification of Network Theorems.
3. Magnetization characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. Predetermination of performance parameters of 1 – Phase Transformer.
6. I – V Characteristics of Solar PV cell
7. Brake test on DC Shunt Motor.
8. Measurement of earth resistance.
9. Measurement of reactive power in three phase balanced circuit.
10. Measurement of Choke coil parameters
11. Brake test on 3 - Phase Induction Motor.
12. Determination of AC quantities using CRO/DSO.
13. I – V characteristics of battery.

COURSE OUTCOMES:

At the end of the course, Student will be able to

CO 1. Identify common electrical equipment used in laboratory.(L1)

CO 2. Estimate the ratings of different equipment used to perform an experiment. (L2)

CO 3. Demonstrate the usage of various electrical measuring instruments.(L3)

CO 4. Analyze the characteristics of rotating & stationery electrical machines (L4).

CO 5. Interpret the characteristics of PV cell and Battery.(L5)

CO/PO Mapping

CO / PO Mapping	Program Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
Identify common electrical equipment used in laboratory.	3		1	1	3	1			3	2	2	2	2	1
Estimate the ratings of different equipment used to perform an experiment.	3	2	3	3	3	2	1		3	3	2	2	2	3
Demonstrate the usage of various electrical measuring instruments.	2	2	2	2	3	1			3	3	1	2	2	1
Analyze the characteristics of rotating & stationery electrical machines.	3	3	3	3	2				3	3		2	3	2
Interpret the characteristics of PV cell and Battery.	3	3	3	3	3		1		3	3	2	2	3	3

Course designed by	Department of Electrical & Electronics Engineering
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CEW201	SEMESTER - I	L	T	P	C
	WORKSHOP	0	0	4	2
	Total Contact Hours – 48				

COURSE OBJECTIVES	
1.	To outline the process of identification of various building components and their estimation
2.	To provide knowledge on operation of the various survey instruments used for linear and angular measurements.
3.	To explain the concepts of identification of minerals and rocks
4.	To explain the concept of measurement of discharge and velocity in a pipe and density of water
5.	To demonstrate automatic weather station

SYLLABUS

LIST OF EXPERIMENTS

1. Ranging – offsets - chainage
2. To find the area of an irregular polygon using chain by using horizontal measurements
3. Determination of bearings and included angles with prismatic compass.
4. Estimation of quantity of bricks, concrete, wood, paint for the given single room building
5. Masonry work: Hands on practice work for different types of bonds in brick masonry
6. Setting out of building : The student is required to set out a building (Single room only) as per the given building plan using tape and cross staff
7. Identification of rock / ore forming minerals
8. Identification of Rocks – Igneous, Sedimentary, Metamorphic rocks
9. Finding the discharge velocity in a water pipe line and find density of water
10. Computation of centre of gravity and moment of inertial of (i) I-sectionand (ii) Channel section.

FOR DEMONSTRATION

11. Demonstration on usage of chain
12. Demonstration on various Building materials used in construction
13. Identification of quality of cement through physical tests
14. Identification of quality of brick through physical tests
15. Identification of soil based on their physical properties
16. Demonstration on Installation of simple sanitary fittings and fixtures like Tap, T-joint, Elbow, bend, threading etc.
17. Demonstration on Automatic weather station for measuring different climatic parameters like Temperature, humidity, rainfall, evaporation etc.,
18. Welding (arc welding and gas welding)
19. Carpentry
20. Indentify deferent types of roads in the campus and write the physical characteristics of layers
21. Demonstration on making of cement mortar/concrete for the given nominal mix
22. Study of a given Toposheet

REFERENCE BOOKS

1. Laboratory manual for Basic civil Engineering workshop compiled by Department of Civil Engineering MVGR College of Engineering (A)

COURSE OUTCOMES:

Learners at the end of this Laboratory course will be able to

1. Identify various components of a building and give lump-sum estimate.
2. Determine distances and irregular areas using conventional survey instruments like chain, tape, cross-staff and compass
3. Identify different soils, minerals and rocks.
4. Know various traffic signs & signals
5. Determine centre of gravity and moment of inertia of channel and I-sections.
6. Set out a signal room building as per given plan
7. Know to observe various climatic parameters using AWS
8. Install simple sanitary filling and find discharge / velocity in a water pipe line as density of water
9. Know to the process of making cement mortar / concrete for nominal mix

A2CEW201- WORKSHOP														
CO/ PO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**PSO-1**	**PSO-2**
COs				√					√			√	√	√

A2CEW201 WORKSHOP	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 09.07.2019
	Ratified by: Meeting of Academic Council, held on

A2EHA701	SEMESTER - I	L	T	P	C
	CONSTITUTION OF INDIA	2	-	-	0
	Total Contact Hours – 30				

SYLLABUS

UNIT – I: HISTORY OF MAKING OF THE INDIAN CONSTITUTION

History - Drafting Committee, (Composition & Working)

UNIT – II: PHILOSOPHY OF THE INDIAN CONSTITUTION: Preamble - Salient Features

UNIT-III: CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES: Fundamental Rights -Right to Equality -Right to Freedom -Right against Exploitation -Right to Freedom of Religion -Cultural and Educational Rights -Right to Constitutional Remedies ; Directive Principles of State Policy ; Fundamental Duties.

UNIT-IV: ORGANS OF GOVERNANCE: Parliament -Composition - Qualifications and Disqualifications - Powers and Functions - Executive - President - Governor - Council of Ministers; Judiciary, Appointment and Transfer of Judges, Qualifications.

UNIT – V: LOCAL ADMINISTRATION: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayati raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat : Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

TEXT BOOK:
Reference Source compilation

REFERENCES:
1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.

COURSE OUTCOMES:

CO1.	Students will be able to discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO2.	Students will be able discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
CO3.	Students will be able to discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP]under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
CO4.	Students will be able to discuss the passage of the Hindu Code Bill of 1956.
CO5.	Students will be able to discuss the powers of Executive, Judiciary and Legislature.

CO/PO Mapping

Course Title:	Constitution of India (Common to ALL Branches)
Course Code:	A2EHA701
Course Designed by	Dept. of English & Humanities

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2								
CO2						2								
CO3						2								
CO4						2								
CO5						2								

Course designed by	DEPARTMENT OF ENGLISH & HUMANITIES
Approval	Approved by: Meeting of Board of Studies held on 23.06.15
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

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A2MAT102	SEMESTER - II	L	T	P	C
	MATHEMATICS-II (MEC,ECE,EEE,CHE & CIV)	3	0	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: NUMERICAL METHODS-1

Solving Algebraic and Transcendental Equations: Intermediate value theorem (statement), solution concepts, error in solution, measure of accuracy, approximate and exact solutions, Solution methods: Bisection method, Regula-Falsi method and Newton-Raphson Iterative method; Finite differences: Forward, backward and shift operators, relations among operators, Interpolation: Interpolation and extrapolation, data of equal and unequal intervals, Newton's forward and backward Interpolation formulae, Lagrange's interpolation formula, Fitting polynomials to the data by using Newton's and Lagrange's formulae, Inverse Interpolation by Lagrange's formula.

UNIT- II: NUMERICAL METHODS-2

Numerical Integration: Simpson's and Trapezoidal rules, Weddle's and Boole's rules of integrations; Numerical solutions of ordinary differential equations: Concepts of Initial Value Problem, Taylor's series method, Euler's method, Runge - Kutta method of fourth order; Predictor-corrector method: Milne's method to solve initial value problems.

UNIT-III: MULTIVARIABLE CALCULUS

Overview: Functions of two variables, limit and continuity, partial derivative and its geometrical meaning; Functions of several variables: Partial differential coefficients of higher order, total derivatives, Chain rules for partial differentiation, partial differentiation of Implicit functions; Jacobians: Jacobian and properties, chain rule, functional dependence, Jacobian of implicit functions

Maxima and Minima: Maxima and minima of a function of two variables, constrained maxima and minima, Lagrange's method of undetermined multipliers.

UNIT-IV: PARTIAL DIFFERENTIAL EQUATIONS -FIRST ORDER

Formation of PDEs: Elimination of arbitrary constants, Elimination of arbitrary functions; Solution concepts of PDEs: Complete solution / integral, particular integral, general integral and singular integral, PDEs solvable by direct integration; Linear PDEs of first order (Lagrange's linear equation): Method of grouping and method of multipliers; Nonlinear PDEs of first order: Solution methods of solving PDEs in standard forms I, II, III & IV (as is specified in Text Book 1).

UNIT-V: PARTIAL DIFFERENTIAL EQUATIONS -HIGHER ORDER

Homogeneous Linear Partial Differential Equations of second and higher order with constant coefficients: Symbolic form, Rules for finding complementary function, Rules for finding particular integral, working procedure to get complete solution; Solving

nonhomogeneous linear PDEs of second and higher order with constant coefficients; Method of separation of variables: concept of boundary value problem, solving boundary value problems by separating variables.

//Topics prefixed with 'outlines / overview' are not for assessment//

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017
2. T.K.V. Iyengar et al, Engineering Mathematics, S. Chand Publishers, Revised edition

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010
3. T. Veerarajan, Higher Engineering Mathematics, Tata McGraw-Hill, 2008

COURSE OUTCOMES: At the end of course, students shall be able to

CO1	Recall the concepts of numerical methods.
CO2	Recall the concepts of multivariable calculus.
CO3	Recall solution methods of PDEs.
CO4	Use the concepts of numerical methods to solve equations, do interpolation & numerical integration and also to solve ODEs numerically.
CO5	Use the concepts of multivariable calculus to find maxima & minima of a multivariable function.
CO6	Use solution methods of PDEs to solve BVPs.
CO7	Apply the concepts of numerical methods, multivariable calculus and PDEs to solve real world problems including BVPs.

CO/PO Mapping

Course Title:	MATHEMATICS-II (MEC,ECE,EEE,CHE & CIV)													
Course Code:	A2MAT102													
Course Designed by	Dept. of Mathematics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2							2			
CO2	3	3		2							2			
CO3	3	3		2							2			
CO4	3	3		2							2			
CO5	3	3		2							2			
CO6	3	3		2							2			
CO7	3	3		2							2			

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 06.07.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PYI101	SEMESTER – II	L	T	P	C
	ENGINEERING PHYSICS (COMMON TO CE , ME & CHEM)	3	-	-	3
	Total Contact Hours – 48				

SYLLABUS

Unit – I: CRYSTALLOGRAPHY [8 hrs]

Introduction- Crystal systems- Bravais lattices- Packing fractions of simple, body centered, face centered cubic structures - Directions and Planes in crystals- Miller indices- Inter planar spacing- Bragg's Law of X-Ray diffraction- Powder X-Ray diffraction method.

Unit –II: LASER & FIBER OPTICS [10hrs]

LASER: Introduction- Absorption, Spontaneous and stimulated emission of radiation- Einstein coefficients- Population inversion- Basic components of laser- Nd YAG Laser – CO_2 Laser- Applications of LASER.

FIBER OPTICS: Introduction- Principle of optical fiber- Numerical Aperture- Acceptance angle- Classification of optic fibers- Applications of fibers.

Unit-III: ULTRASONICS & ACOUSTICS [10hrs]

Ultrasonics-Introduction- Properties of ultrasonic sounds- Generation of Ultrasonic sounds- Magnetostriction- Piezoelectric effect- Detection- Kunts tube- Converse piezoelectric method- Ultrasonic Nondestructive testing technique (pulse-echo technique under reflection mode)- Applications.

ACOUSTICS- Introduction– Reverberation- Reverberation time- Sabines formula for reverberation time- Absorption coefficient and its measurement- Factors effecting acoustic design of hall.

Unit – IV: THERMODYNAMICS [10hrs]

Introduction- First Law- Isothermal process- Adiabatic process- Work done- Second Law- Carnot's heat engine- Efficiency- Entropy- Physical significance- Entropy and second law- Temperature entropy diagram- Third Law of Thermodynamics- Applications of thermodynamics.

Unit – V: PRINCIPLES OF MECHANICS [10hrs]

Introduction- System of forces- Resultant of coplanar forces- Method of resolution- Parallel forces- Moment of force- Varignon theorem- Force system in space- Friction- Limiting friction & Impending motion- Coulomb's laws of dry friction- Coefficient of friction- Cone of friction- Types of friction (qualitative).

TEXTBOOKS

1. Engineering Physics by R.K. Gaur and S.L. Gupta, Dhanpat Rai Publications.

REFERENCES

1. RESNICK, HALLIDAY and WALKER, Principles of Physics, Wiley Publishers
2. A.NELSON, Engineering Mechanics: Statics & Dynamics by, Tata Mc Graw Hill Publishers.
3. P.K. NAG, Engineering Thermodynamics, Mc. Graw Hill Publishers

COURSE OUTCOMES:

CO1. The student will be able to recognize the underlying principles of crystalline solids, LASER production and Optical fibers

CO2. The student will be able to gain knowledge on the fundamentals of acoustics and production & detection of ultrasonics

CO3. The student will be able to describe the essentials of thermodynamics, force systems and friction.

CO4. The student will be able to understand crystal structures and X-ray diffraction as a tool for crystal structure analysis.

CO5. The student will be able to understand the importance of industrially relevant LASERS, applications of optical fibers and the prominence of ultrasonics in nondestructive testing.

CO6. The student will be able to understand basic processes involved in thermo-dynamical systems and force systems

CO7. The student will have the ability to apply the conceptual knowledge of forces and its related physical quantities in solving engineering problems.

CO/PO MAPPING:

Course Title:	Engineering Physics													
Course Code:	A2PYI101													
Course Designed by	Dept. of Physics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3						1				1		
CO2	3	3						1				1		
CO3	3	3						1				1		
CO4	3	3						1				1		
CO5	3	3						1				1		
CO6	3	3						1				1		
CO7	3	3						1				1		

Course designed by	DEPARTMENT OF PHYSICS
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PYI101	SEMESTER – II	L	T	P	C
	ENGINEERING PHYSICS LAB	-	-	3	2
	Total Contact Hours – 42				

LIST OF EXPERIMENTS

1.	Determination of size of the micro dimensional system by Laser diffraction.
2.	Determination of numerical aperture and acceptance angle of the optic fiber.
3.	Determination of lattice constants of the crystal systems.
4.	Verification of laws of transverse vibrations in stretched strings by using Sonometer.
5.	Determination of velocity of ultrasonic sounds in liquids by acoustic grating method
6.	Determination of thermal conductivity coefficient of the disc shaped material.
7.	Determination of specific heat of the given liquid by Newton's law of cooling principle.
8.	Determination of temperature coefficient resistance for the thermistor.
9.	Determination of the static friction coefficient.
10.	Determination of rigidity modulus of the wire shaped material by using Torsional pendulum.

TEXTBOOKS:

1. BALASUBRAMANIAN.S, SRINIVASAN.M..N, A Text book of Practical Physics, S Chand Publishers, 2017

REFERENCES:

1. https://vlab.amrita.edu.

COURSE OUTCOMES:

CO1. Design experiments to determine the size of the micro-dimensional system and the parameters impelling communication through optic fibre.

CO2. Investigate the powder X-Ray diffraction patterns for crystal structure analysis.

CO3. Design experiments for demonstration of mechanical resonance and determine the velocity of ultrasonic sounds in liquid media.

CO4. Design experiments to determine physiognomies of materials like the thermal conductivity coefficient (K), specific heat (s) and temperature coefficient of resistance (α).

CO5 Design experiments to determine the mechanical properties like the rigidity modulus (η) and the static friction coefficient (μ_s).

CO/PO MAPPING:

Course Title:	Engineering Physics Lab													
Course Code:	A2PYI101													
Course Designed by	Dept. of Physics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3						1	2	1		1		
CO2	3	3						1	2	1		1		
CO3	3	3						1	2	1		1		
CO4	3	3						1	2	1		1		
CO5	3	3						1	2	1		1		

Course designed by	DEPARTMENT OF PHYSICS
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CIT201	SEMESTER – II	L	T	P	C
	PROGRAMMING FOR PROBLEM SOLVING	3	0	0	3
	Total Contact Hours : 54				
	Prerequisites: Mathematics				

COURSE OBJECTIVES	
COBJ1.	Students will study systematic approach to problem solution specification using finite number of unambiguous steps.
COBJ2.	Students will gain understanding of procedural language features using C as the template.
COBJ3.	Students will read and analyse alternative construct choices in procedural language C.
COBJ4.	Students will get exposure to systematic approach of automated solution design, implementation and testing using a procedural language.

SYLLABUS

UNIT – I: [9 HOURS]

INTRODUCTION: Introduction to Programming, Computer System, Hardware and Software concepts.

PROBLEM SOLVING: Algorithm, Pseudo-code, flow-chart, program development steps, high-level, Assembly and machine languages.

BASICS OF C PROGRAMMING: Structure of C program, identifier, basic data types and sizes, constants, variables, arithmetic operators, relational operators, logical operators, increment and decrement operators, assignment operator, conditional operator, scanf and printf built-in functions, Creating and running programs.

UNIT – II: [9 HOURS]

BIT-WISE OPERATORS: logical, shift, rotation, masks.

EXPRESSIONS: expressions, type conversions, conditional expressions, precedence and order of evaluation.

SELECTION: Two-way selection: if-else, nested if, examples, multi-way selection: switch, else-if, examples.

ITERATIVE: loops - while, do-while and for statements, break continue, event and counter controlled loops.

UNIT – III: [18 HOURS]

Part – I: [9 HOURS]

ARRAYS: Arrays (1-D, 2-D), Character arrays and Strings, Searching (Linear Search and Binary Search).

Part – II: [9 HOURS]

BASIC ALGORITHMS: Basic Sorting Algorithms (Bubble, Insertion and Selection), comparing algorithms for complexity.

FUNCTIONS: Functions, Scope and Extent of Variables, Function Parameters, parameter passing using call-by-value, sub-routines, Storage Classes,#define,#ifdef, #ifndef pre-processor directives.

UNIT – IV: [9 HOURS]

RECURSION: Definition of Recursion, example programs using recursion like finding Factorial, Fibonacci series, Quick sort, puzzle solving using recursive functions (towers of hanoi, ackerman function).

POINTERS: Definition of Pointers, Pointer Type, Pointer Arithmetic, Function parameter passing using call-by-reference.

MEMORY ALLOCATION: Difference between static and dynamic memory allocation, dynamic memory allocation using built-in functions, dangling pointer, unreferenced memory problem.

UNIT – V: [9 HOURS]

ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, bit-fields, concept of linked list, program applications.

FILE-HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, command line arguments.

Suggested Text Books

1. Programming For Problem Solving, Behrouz A.Forouzan & Richard F.Gilberg, Cengage Publishers, 3rd Edition
2. Programming In C:A Practical Approach, Ajay Mittal, Pearson Education

Suggested Reference Books

1. Brian W. Kernighan And Dennis M. Ritchie, The C Programming Language, Prentice Hall Of India
2. Introduction To C Programming, Reema Thareja, Oxford University Press
3. E. Balaguruswamy, Programming In Ansi C, Tata Mcgraw-Hill

COURSE OUTCOMES

The student will

1. Have the ability to **describe** a formal algorithmic solution for the given problem, **list** the features of C including scalar & vector data types, operators, **Outline** expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.

2. Have the ability to **describe** one and two-dimensional arrays, **outline** loops and arrays for searching and **describe** various sorting techniques.

3. Have the ability to **outline** the purpose of functions, pointers, command line arguments, dynamic memory allocation. **Define** storage classes. **Describe** command like arguments, structures, unions, and enumeration. Have knowledge of handling files.

4. Have the ability to **solve** complex expressions, **design** algorithms and **develop** programs in C language using the basic constructs, data types, operators, control & iterative statements, and arrays.

5. Have the ability to **apply** arrays to solve complex matrix related problems and strings. **Compare and contrast** various searching and sorting techniques for complexity.
6. Have the ability to **distinguish between** function call types. **Draw inferences on** command line arguments, storage classes, and pre-processor directives. **Use** pointers with functions, arrays, strings, to **solve** complex problems. **Give example** and **solve** classical recursion problems**. Compare and contrast** static and dynamic memory allocation, and **apply** them. **Use** structures and unions to implement and **solve** real-time problems. **Apply** file related functions to process files.

7. Have the ability to **Fully appreciate** the art of procedural programming in C and develop programs **optimally** using the full feature set of C language.

Course Title:	Programming for problem solving (Common to ALL Branches)														
Course Code:	A2CIT201														
Course Designed by	Dept. of Computer Science and Engineering														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSOM	PSON	PSOO
CO1	3	3						3	2	1		2	1	1	1
CO2	3	3						3	2	1		2	1	1	1
CO3	3	3						3	2	1		2	1	1	1
CO4	3	3	3	3	3	3	3	3	2	1	1	2	3	3	3
CO5	3	3	3	3	3	3	3	3	2	1	1	2	3	3	3
CO6	3	3	3	3	3	3	3	3	3	1	1	2	3	3	3
CO7	3	3	3	3	3	3	3	3	3	1	1	3	3	3	3

Levels of Correlation: High-3, Medium-2, Low-1

PROGRAMMING FOR PROBLEM SOLVING PRACTICE

COURSE OBJECTIVES	
1.	To use basic data types, operators, expressions and expression evaluation mechanisms using C Programming Language.
2.	To implement control flows construct in C Programming Language and understand the syntax, semantics and usability contexts of these different construct.
3.	To develop composite data types in C and constructs available to develop their data-types, utilize them to model things and dealing with data from and to external files.
4.	To design programs with different variations of the constructs available for practicing modular programming and understand the pros and cons of using different variants and apply optimization.

UNIT – I

WEEK 1:

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using computers
Lab1: Familiarization with programming environment

i) Exposure to Turbo C, gcc, Code Blocks IDE
ii) Writing simple programs using printf(), scanf()

WEEK 2:

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments/Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts
Lab1: Converting algorithms/flowcharts into C Source code

Developing the algorithms/flowcharts for the following sample programs

i. Sum and average of 3 numbers
ii. Conversion of Fahrenheit to Celsius and vice versa
iii. Simple interest calculation

WEEK 3:

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:
Lab 3: Simple computational problems using arithmetic expressions

i) Finding the square root of a given number
ii) Finding compound interest
iii) Area of a triangle using heron's formulae
iv) Distance travelled by an object

UNIT – II

WEEK 4:

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and their precedence and associativity:
Lab 4: Simple computational problems using the operator's precedence and associativity

i) Evaluate the following expressions
   a. A+B*C+(D*E)+F*G
   b. A/B*C-B+A*D/3
ii) a. A+++B---A
   b. J=(i++)+(++i)
iii) Find the maximum of three numbers using conditional operator
iv) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5:

Objective: Explore the full scope of different variants of "if construct" namely if-else, null-else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures

i) Write a C program to find the max and min of four numbers using if-else
ii) Write a C program to generate electricity bill
iii) Find the roots of the quadratic equation
iv) Write a C program to simulate a calculator using switch case
v) Write a C program to find the given year is a leap year or not

WEEK 6:

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops:
Lab 6: Iterative problems e.g., the sum of series

i) Find the factorial of given number using any loop
ii) Find the given number is a prime or not
iii) Compute sine and cos series
iv) Checking a number palindrome
v) Construct a pyramid of numbers

UNIT – III

WEEK 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1D Arrays: searching
Lab 7: 1D Array manipulation, linear search

i) Find the min and max of a 1-D integer array
ii) Perform linear search on1D array
iii) The reverse of a 1D integer array
iv) Find 2's complement of the given binary number
v) Eliminate duplicate elements in an array

WEEK 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2D arrays, Sorting and Strings
Lab 8: Matrix problems, String operations, Bubble sort

i) Addition of two matrices
ii) Multiplication two matrices
iii) Sort array elements using bubble sort
iv) Concatenate two strings without built-in functions
v) Reverse a string using built-in and without built-in string functions

UNIT-IV

WEEK 9:

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 9: Functions, call by value, scope and extent,
Lab 9: Simple functions using call by value, Solving differential equations using Eulers theorem

i) Write a C function to calculate NCR value
ii) Write a C function to find the length of a string
iii) Write a C function to transpose of a matrix
iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 10:

Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 10: Recursion, the structure of recursive calls

Lab 10: Recursive functions

i) Write a recursive function to generate Fibonacci series
ii) Write a recursive function to find the lcm of two numbers
iii) Write a recursive function to find the factorial of a number
iv) Write a C Program to implement Ackermann function using recursion
v) Write a recursive function to find the sum of series.

WEEK 11:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 11: Call by reference, dangling pointers
Lab 11: Simple functions using Call by reference, Dangling pointers

i) Write a C program to swap two numbers using call by reference
ii) Demonstrate Dangling pointer problem using a C program
iii) Write a C program to copy one string into another using pointer
iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

UNIT – V

WEEK 12:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc(), calloc(), realloc() and free() functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 12: Pointers, structures and dynamic memory allocation
Lab 12: Pointers and structures, memory dereference

i) Write a C program to find the sum of a 1D array using malloc()
ii) Write a C program to find the total, average of n students using structures
iii) Enter n students data using calloc() and display failed students list
iv) Read student name and marks from the command line and display the student details along with the total.
v) Write a C program to implement realloc()

WEEK 13:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly-linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 12: Bitfields**,** Self-Referential Structures, Linked lists
Lab 12: Bitfields, linked lists

i) Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit-fields
ii) Create and display a singly linked list using self-referential structure
iii) Demonstrate the differences between structures and unions using a C program
iv) Write a C program to shift/rotate using bitfields
v) Write a C program to copy one structure variable to another structure of the same type.

WEEK 14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling:
Lab 14: File operations

i) Write a C program to write and read text into a file
ii) Write a C program to write and read text into a binary file using fread() and fwrite()
iii) Copy the contents of one file to another file
iv) Write a C program to merge two files into the third file using command-line arguments
v) Find no. of lines, words and characters in a file
vi) Write a C program to print last n characters of a given file.

TEXTBOOKS:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

REFERENCES:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India
2. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

COURSE OUTCOMES

CO1.	**Demonstrate** the ability to write a formal algorithmic solution for the given problem, **name & explain** the features of C like types including scalar & vector types, operators, expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.
CO2.	**Implement** one and two-dimensional arrays to solve simple mathematical and matrix related problems. **Make use of** loops and arrays for searching and **Compare** various sorting techniques.
CO3.	**Identify** the purpose of functions, pointers, command line arguments, dynamic memory allocation. **Define** storage classes. **Understand** command like arguments, structures and unions. Have **knowledge** of handling files.
CO4.	**Design** algorithms and **develop** programs in C language using the basic constructs, data types, operators, control statements, and arrays.
CO5	**Apply** pointers, functions, derived data types, and dynamic memory allocation, **design** solutions to challenging problems.
CO6	**Illustrate** the art of procedural programming in C and **develop** programs optimally using the full feature set of C language.

Course Title:	Programming for problem solving lab														
Course Code:	A2CII201														
Course Designed by	Dept. of CSE & IT														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2	3	1	1	1	2	2			2	2	2
CO2	3	3	1	2	3	1	1	1	2	2			2	2	2
CO3	3	3	2	3	3	2	1	1	2	2			3	3	3
CO4	3	3	2	3	3	3	1	1	2	2			3	3	3
CO5	3	3	3	3	3	3	1	1	2	2			3	3	3
CO6	3	3	3	3	3	3	1	1	3	3	3		3	3	3

Levels of Correlation: High-3, Medium-2, Low-1

Course designed by	DEPARTMENTS OF CSE & IT
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019

A2EHL001	SEMESTER - II	L	T	P	C
	Essential Communication in English	1	-	3	3
	Total Contact Hours – 60				

SYLLABUS

UNIT – I: BASIC LANGUAGE SKILLS – A REFRESHER

Organs of Speech: Consonant Sounds &Vowel Sounds; Phonemic Transcription; Using a Dictionary to know the Pronunciation of a word

Presenting Oneself: Introducing oneself -Using different expressions in Formal&Informal Contexts.

Reading a News Article: Identifying the key words and their usage; summarizing the information

Word Study & Mind Mapping: Root words–Derivatives; Homonyms, Homographs, Homophones; Synonyms & Antonyms

UNIT – II: RUDIMENTS OF FUNDAMENTAL COMMUNICATION

The World: Listening & watching Documentaries on World famous Places.

Describing People, Places and Life experiences: Physical Description- Describing someone's qualities – Usage of Jargon to present topography.

Short Story Corner: Reading a short story – Understanding the mood and essence – Sharing different perspectives.

Sentence Patterns: Concord – Rules – Common errors in day-day usage

UNIT-III: COMMUNICATION AT PRACTICE

Oratory Skills: Listening to World's Famous Speeches

JAM (Just a Minute) Talk: Format & Delivery Techniques

Nuances of Language: Company Description –Position Description (Formal) – processes like Chocolate Making(Informal)**.**

Types of Sentences – Declarative, Interrogative, Assertive etc.

UNIT-IV: COMMUNICATION THROUGH CONCEPTUAL LEARNING

BBC English: Watching interviews of Famous people.

Dialogue Practice: Situational Dialogues; Structuring a Role Play

New Inventions: Reading about latest technology pertaining to different fields (Source : Science Journals)

Transformation of sentences: Active Voice-Passive Voice**,** Direct & Indirect Speech**,** Degrees of Comparison**,** Simple Compound & Complex Sentences.

UNIT – V: COMMUNICATION THROUGH LIFE SKILLS

Watching Movies for Language Enrichment & Writing Reviews.

Skits: Enacting a Skit on a Social Issue

Reflections: Reading News Paper Editorial columns, Literacy Reviews, Poetry

Presenting an autobiography: Exploring different styles of writing autobiographies and evolving an own style**.**

TEXT BOOK:
Reference Source Compilation by the Department

REFERENCES:
1. **Fundamentals of Technical Communication** by Meenakshi Raman,OUP.
2. **Living English Structure** by W.Stannard Allen, Pearson Publications.
3. **English Made Easy** by Mary Margaret Hosler, Mc Graw Hill.
4.. **English and Communication Skills for Students of Science and Engineering**, by Dhanavel, S.P. Orient Blackswan Ltd.
5. **The Oxford Guide to Writing and Speaking** by John Seely , OUP

COURSE OUTCOMES:

CO1. Student will be able to come to terms with the basic language Skills required to cater to the requirement of the programme undertaken.

CO2. Student will be able to comprehend and analyze the core concepts well.

CO3. Student will be able to gain proficiency in all four skills of Language – Listening, Reading, Speaking and Writing.

CO4. Student will be able to understand the Syntactical and Grammatical Components of English Language and their correct use.

CO5: Student will be able to present his/her ideas confidently in a Professional manner.

CO/PO Mapping

Course Title:				**Essential Communication in English**										
Course Code:				A2EHL001										
Course Designed by				Dept. of English & Humanities										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2		2	3	3		3		
CO2						2		2	3	3		3		
CO3						2		2	3	3		3		
CO4						2		2	3	3		3		
CO5						2		2	3	3		3		

Course designed by	DEPARTMENT OF ENGLISH & HUMANITIES
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2MED201	SEMESTER - II	L	T	P	C
	COMPUTER AIDED ENGINEERING GRAPHICS	1	-	3	3
	Total Contact Hours – 60				

SYLLABUS

UNIT-I

Overview of Computer Graphics:

Computer technologies that impact on graphical communication, Demonstrating knowledge of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line, The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.

Set up of the drawing page and the printer, Scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing.

Applying dimensions to objects, applying annotations to drawings;

UNIT-II

Layers: Setting up and use of Layers, layers to create drawings, create, edit and use customized layers, concept of view ports.

Introduction to Orthographic Projections: Projections of Points; Projections of Straight Lines parallel to both planes; Projections of Straight Lines-Parallel to one and inclined to other plane.

UNIT-III

Projections of Straight Lines and Planes: Lines inclined to both planes, determination of true lengths, angle of inclinations and traces, Projections of Planes

UNIT-IV

Projections and sections of solids: Projections of simple solids- Sections of solids

UNIT -V

Development of surfaces, Isometric Projection and Conversion of Isometric Views to Orthographic Views: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa

TEXT BOOKS

1. DM Kulkarni, AP Rastogi, AK Sarkar "Engineering graphics with Auto CAD" PHI Publishers
2. Bhatt N.D., Panchal V.M. & Ingle P.R "Engineering Drawing" Charotar Publishing House.

REFERENCE BOOKS

1. Shah, M.B. & Rana B.C "Engineering Drawing and Computer Graphics", Pearson Education.
2. Agrawal B. & Agrawal C. M "Engineering Graphics", TMH Publication.
3. Narayana, K.L. & P Kannaiah "Engineering Drawing", SciTech Publishers.
4. CAD Software Theory and User Manuals.

COURSE OUTCOMES

At the end of the course the students will be able to:

CO1: Prepare two dimensional drawings using draw and modify commands in Auto CAD software and represent dimensions to the drawings

CO2: Clearly differentiate different types of projections and get solutions to projections of points in Auto CAD by applying the layers concept

CO3: Solve problems related to projections of straight lines and planes

CO4: Prepare simple solids in CAD software and obtain solutions to projections and sections of solids

CO5: Develop the surfaces of simple solids, prepare Isometric drawings and convert isometric drawings into orthographic views

CO/PO Mapping

Course Title:	Computer Aided Engineering Graphics													
Course Code:	A2MED201													
Course Designed by	Dept. of Mechanical Engineering													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2		3	1		1	2	3	2	2	3	2
CO2	3	2	2		3	1		1	2	3			2	1
CO3	3	2	2		3	1		1	2	3			2	1
CO4	3	2	3		3	1		1	2	3	2	2	3	1
CO5	3	2	3		3	1		1	2	3	2	2	3	1

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

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B.Tech(EEE)

MAHARAJ VIJAYARAM GAPATHI RAJ COLLEGE OF ENGINEERING(AUTONOMOUS)
Vijayaram Nagar Campus, Chintalavalasa, Vizianagaram-535005, Andhra Pradesh
Accredited by NAAC with 'A' Grade & Listed u/s 2(f) & 12(B) of UGC
(Approved by AICTE, New Delhi and Permanently Affiliated by JNTUK-Kakinada)
NBA Accredited UG Courses: B.Tech(MEC), B.Tech(CIV), B.Tech(EEE), B.Tech(ECE), B.Tech(CSE), B.Tech(IT), B.Tech(MEC) & B.Tech(CHE) and PG Course: MBA

ACADEMIC REGULATIONS & CURRICULUM

Applicable to the students admitted from the Academic Year 2019-2020

ELECTRICAL AND ELECTRONICS ENGINEERING

(B.Tech. Programme)

MAHARAJ VIJAYARAM GAJAPATHI RAJ COLLEGE OF ENGINEERING

(Autonomous)

(Approved by AICTE, New Delhi, and permanently affiliated to JNTUK, Kakinada)

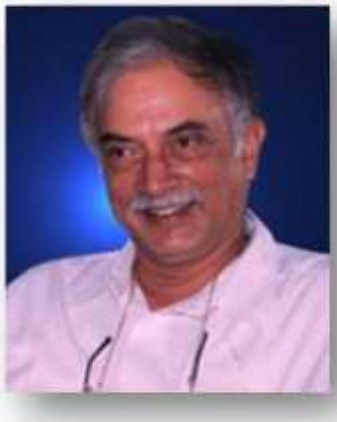
Listed u/s 2(f) & 12(B) of UGC Act 1956.

Vijayaram Nagar Campus, Chintalavalasa,Vizianagaram-535005, Andhra Pradesh

The visionaries

Late Dr. P V G Raju
Raja Saheb of Vizianagaram
Founder Chairman-MANSAS
Ex-Minister for Education and Health, Govt. of AP
Ex Member of Parliament

Late Dr. P. Anand Gajapathi Raju
Ex-Chairman-MANSAS
Ex-Minister for Education and Health
Govt. of AP
Ex Member of Parliament



P. Ashok Gajapathi Raju
Chairman-MANSAS
Ex-Union Minister for Civil Aviation,
Govt. of India
Ex-Minister for Finance, Govt. of AP

Vision

Maharaj Vijayaram Gajapathi Raj College of Engineering strives to become a centre par excellence for technical education where aspiring students can be transformed into skilled and well-rounded professionals with strong understanding of fundamentals, a flair for responsible innovation in engineering practical solutions applying the fundamentals, and confidence and poise to meet the challenges in their chosen professional spheres.

Mission

The management believes imparting quality education in an atmosphere that motivates learning as a social obligation which we owe to the students, their parents/guardians and society at large and hence the effort is to leave no stone unturned in providing the same with all sincerity. Towards that end, the management believes special focus has to be on the following areas:

M1: Have on-board staff with high quality experience and continuously updating themselves with latest research developments and sharing that knowledge with students.

M2: Having a well stream-lined teaching learning process that is continuously assessed for effectiveness and fine-tuned for improvement.

M3: Having state-of-the-art lab and general infrastructure that gives students the necessary tools and means to enhance their knowledge and understanding.

M4: Having a centralized department focused on improving placement opportunities for our students directly on campus and coordinating the training programs for students to complement the curriculum and enhance their career opportunities.

M5: Having advanced research facilities and more importantly atmosphere to encourage students to pursue self-learning on advanced topics and conduct research.

ABOUT THE INSTITUTION:

Maharajah Alak Narayan Society of Arts and Science (MANSAS) is an Educational Trust founded by Dr. (late) P.V.G Raju, Raja Saheb of Vizianagaram in the hallowed memory of his father Maharajah Alak Narayan Gajapati with a view to confound socio-economic inequalities in the Vizianagaram principality executing a trust deed on 12-11-1958 duly established Maharajah's College and other educational institutions in and around Vizianagaram. The Trust is a charitable one published under Section 6 a (1) of A.P Charitable and Hindu Religious Institutions and Endowment Act 30 of 1987.

The object of the Trust is to manage the properties of educational institutions under it and to promote and advance the cause of education in general, besides awarding scholarships to deserving students enabling them to undergo special training in science and industries in and out of India. The Trust has made an uncompromising contribution to the nation by presenting the stalwarts.

Trust offers KG to PhD level education in Arts, Sciences, Law, Pharmacy, Humanities Education, Engineering and Management and presently houses 13 Educational Institutions. MVGR College of Engineering is one of the 13 Institutes.

Other Institutions under MANSAS

1. M.R. HIGH SCHOOL 1857
2. M.R COLLEGE **(NAAC ACCREDITED)** 1879
3. M.R. COLLEGE OF EDUCATION 1950
4. M.R. WOMENS COLLEGE **(NAAC ACCREDITED)** 1962
5. M.R. GIRLS HIGH SCHOOL 1974
6. M.R. MODEL HIGH SCHOOL 1974
7. M.R. ENGLISH MEDIUM SCHOOL 1979
8. M.R.V.R.G.R LAW COLLEGE 1987
9. M.R. P.G. COLLEGE **(NAAC ACCREDITED)** 1987
10. M.R.SCHOOL OF MANAGEMENT STUDIES 1994
11. M.R.V.R.G.R – II MEMORIAL JR. COLLEGE 1994
12. M.R. COLLEGE OF PHARMACY 2004

Maharaj Vijayaram Gajapathi Raj (MVGR) College of Engineering was established in the year 1997 by Maharaj Alak Narayan Society for Arts and Sciences (MANSAS) to impart quality technical education. The Institution is located in lush green, serene and pollution free environment spread over 60 acres of land in Chintalavalasa village situated in the outskirts of Vizianagaram, a fort city in the north coastal region of Andhra Pradesh.

Institution at a glance:

- MVGR is a 22 years old institution, established in 1997
- All eligible UG Programs (CHEMICAL, CIV, CSE, ECE, EEE, IT & MECHANICAL) were reaccredited by NBA.
- MBA program was also re-accredited by NBA.
- Had been re-accredited with Grade 'A' by NAAC of UGC
- Has Permanent affiliation with JN Technological University-Kakinada
- Listed under sections 2(f) & 12(b) of UGC act 1956.
- Approved by AICTE-New Delhi
- EIGHT departments are recognized as RESEARCH CENTERS by JNTU-K
- Granted Autonomy by UGC in 2015
- Campus of 60 acre
- Offering 7 UG and 5 M.Tech., and 1 MBA program
- About 250 faculty of which 84 Ph.D. Degree holders
- 83 Laboratories with an investment of about 13 Crores
- Total built up area of about 7 Lakh Sft
- About 42,000 volumes and Access to 8 international online journal packages like IEEE, SPRINGER, etc.
- 1420 Systems & 395 Mbps band width internet facility
- About Rs. 4 Crore worth of on-going R&D projects
- Actively involved in civil engineering consultancy work as Third Party Quality Auditor for Vizianagaram Municipality
- WIPRO Recognized technology learning center and MISSION 10X partner institution
- Recognized National Instruments Academy for Training in LabView
- SIRO Recognition by DSIR
- Recognized PTC Centre of Excellence for Creo Training
- Identified by MSME as Business Incubation Centre
- APSSDC-Siemens Technical Skill Development Institute
- Recognized CMs SKILL EXCELLENCY CENTER (SEC)
- Microsoft Ed-vantage Platinum Partner
- Institutional member of IUCEE
- Institutional Member of CII
- Member, Chamber of Commerce, Vizianagaram
- Green Campus award by Govt. of AP

MVGR College of Engineering is rated as one among the best engineering colleges in the state of Andhra Pradesh as it set up highest standards in all areas of curricular, co-curricular and extra-curricular activities and in students' placements. Based on industry and expert's feedback, the college is updating the curriculum from time to time. The college offers many value added add-on courses students and conducts training programs to meet the industries' requirements.

Academic Regulations for B.Tech., Program

Applicable to the students admitted from the Academic year 2019-2020 onwards.

1. PROGRAM STRUCTURE:

B.Tech.:

Sl. No	Category	Credits
1	Humanities and Social Sciences including Management courses	12
2	Basic Science courses	25
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	26
4	Professional core courses	54
5	Professional Elective courses relevant to chosen specialization/branch	18
6	Open subjects – Electives from other technical and /or emerging subjects	12
7	Project work, seminar and internship in industry or elsewhere	13
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	0
	Total	160

- Open electives offered by the parent department are listed in the course structure and are offered to students of other programs. The students of parent departments may also opt the course, provided it shall not be listed in the curriculum.
- For audit course a student is deemed to satisfy the minimum contact hours, as prescribed by the department and shall also comply with the requirements for submission of assignments/projects. A student shall also opt for MOOCs and submit the certificate.

1. HSS Courses		
Sl. No.	Subject	Credits
1	English -1	3
2	English -2 (Technical English)	3
3	Elective-1 (Management Related course (MEFA or MS or Operations Research)	3
4	Elective-2 (Professional Ethics and Human Values)	3
	Total	**12**

2. Basic Science Courses		
Sl. No.	Subject	Credits
1	Mathematics-I	3
2	Mathematics-II	3
3	Mathematics-III	3
4	Mathematics-IV	3
5	Applied / Engineering Physics (Theory + Lab)	5
6	Engineering Chemistry (Theory + Lab)	5
7	Biology for Engineers	3
	Total	**25**

3. Engineering Science Courses		
Sl. No.	Subject	Credits
1	Programming for Problem Solving (Theory + Lab)	5
2	Internet of Things (IOT)	3
3	Computer aided Engineering Graphics	3
4	Basic Electrical Engineering (Theory + Lab)	5
5	Department wise Engineering Science Course-I (AI Tools , Techniques & Applications)	5
6	Department wise Engineering Science Course-II (Design thinking and Product Innovation)	3
7	Workshop (Department Specific)	**2**
	Total	**26**

	Subjects	Credits
4	**Professional Core Courses**	54
5	**Professional Elective Courses Relevant to Chosen Specialization/Branch**	18
6	**Open Subjects – Electives from other Technical and / or Emerging Subjects**	12
		84

7. Project		
Sl. No.	Subject	Credits
1	Socially Relevant Project	1
2	Mini Project	2
3	Project Phase - I	2
4	Project Phase - II	8
	Total	**13**

8. Audit Courses (Non Credit Course)		
Sl. No.	Subject	
1	Induction Program	
2	Constitution of India	
3	Indian Traditional Knowledge	
4	Environmental Science	

BOS Chairman shall notify the list of MOOCs offered (Open Elective & Professional Elective) in the beginning of the semester.

2. PROGRAM PATTERN:

B.Tech.: The program is for 4 academic years / 8 semesters.

B.Tech. (Lateral Entry): The program is for 3 academic years / 6 semesters.

3. AWARD OF DEGREE:

B.TECH:

A student will be declared eligible for the award of degree if he/she fulfills the following academic regulations.

a) A student shall be declared eligible for the award of degree, if he/she pursues a course of study for not less than four academic years and not more than eight academic years from the date of admission.

b) The student shall register for **160** credits and secure all **160** credits.

c) A student shall also register and successfully complete audit programs (Non-credit) as recommended by Academic Council.

d) A student on completing 1st year class work may opt for a break of 1 year which shall be deemed as GAP year, as recommended by APSCHE, for undertaking successful entrepreneurial ventures.

e) Students who fail to complete Four Years Course of study within 8 years shall forfeit their seat and their admission shall stand cancelled.

B.TECH (Lateral Entry):

A student will be declared eligible for the award of degree on fulfilling the following academic requirements.

a) A student shall be declared eligible for the award of the degree, if he/she pursues a course of study for not less than three academic years and not more than six academic years.

b) The student shall register for **126** credits and secure all **126** credits.

c) A student shall also register and successfully complete audit programs (Non-credit) as recommended by Academic Council.

d) Students who fail to complete their three Years Course of study within 6 years shall forfeit their seat and their admission shall stand cancelled.

e) Student shall register for bridge programs, if any, as administered by the respective departments at the beginning of 2nd year and successfully complete as per the guidelines of the Institution.

4. CERTIFICATION PROGRAMS:

Sl. No.	Dept.	Name of the Program
1	MECH	Windchill 10.2 PDM by Adroitec Engineering Solutions Pvt. Ltd., Hyderabad
2	MECH	Creo 2.0 by PTC
3	MECH	Edgecam by Verosoft, UK
4	MECH	ANSYS Training and Certification by Mechanical Department
5	MECH	AUTOCAD Training and Certification by Mechanical Department
6	MECH	Catia by APSSDC-Dassault Systems, CM's Center of Excellence
7	MECH	Delmia by APSSDC-Dassault Systems, CM's Center of Excellence
8	MECH	Simulia by APSSDC-Dassault Systems, CM's Center of Excellence
9	MECH	2-Wheeler Automobile Certification by APSSDC-SIEMENS
10	MECH	4-Wheeler Automobile Certification by APSSDC-SIEMENS
11	MECH	Welding Certification by APSSDC-SIEMENS
12	MECH	CNC Certification by APSSDC-SIEMENS
13	MECH	Commercial Electrical Certification by APSSDC-SIEMENS
14	MECH	Solid Edge Certification by APSSDC-SIEMENS
15	CHEM	Chemical Process Design and Simulation by Simtech Simulations, Hyderabad
16	ECE	Embedded Systems by Think LABS, Mumbai
17	ECE	Labview by National Instruments Systems India Pvt. Ltd.
18	ECE	Unified Technology Learning Program (UTLP) by Wipro Mission 10X
19	CSE, IT	PEGA by Virtusa Corporation
20	CSE, IT	Microsoft technologies by Microsoft Corp.
21	CSE, IT	Ethical Hacking by EC-Council Academia
22	CSE, IT	Java and C by Talent Sprint
23	CSE, IT	Network Analyst (CCNA) by Cisco Systems Inc
24	CSE, IT	Java Programming (OCJP) and DBMS by Oracle
25	EEE	PLC, Drives and Automation by Siemens
26	EEE	PLC by New Dawn Automation
27	EEE	Home Electrical Certification by APSSDC-SIEMENS
28	Civil	Remote Sensing and GIS by Indian Institute of Remote Sensing

a) The Institution shall offer the certification programs by itself or in collaboration with industry/such other Institutions deemed to have specialized expertise in the proposed area of training.
b) Only students of the Institution shall be eligible to register on payment of prescribed fee.
c) However, subject to availability of resources and the demand the Institution may offer the program to external candidates meeting the pre-qualification requirements and in the order of the merit.
d) The duration of the course and design of the content shall be done by the respective departments of the Institution by themselves or in collaboration with industry/such other institutions deemed to have specialized expertise in the proposed area of training.
e) If the duration of the course is less than or equal to 40 hours, it can be completed in one semester, otherwise, it can suitably distributed over a number of semesters.
f) Mere enrolment/registration for the program shall not entitle any claim for award of certificate.
g) A candidate shall be deemed eligible for the award of the certificate if he/she
   - Attends at least 75% of scheduled training sessions
   - Complies to all the requirements of submission of the assignments, presentations, seminars, projects, etc., and also appears for periodic tests.
   - Shall attain minimum levels of performance in tests as prescribed.
   - Shall remit such fee as deemed fit for the certification
   - A candidate registered and failed to meet the requirements shall be permitted to repeat the said training one another time after remitting 25% of the fee fixed for the program as re-registration fee.

If the student is absent for the periodic tests, the test shall be re-conducted on payment of 10% of fee.

5. COURSES OFFERED:

Name of the Program	Degree
UG Programs (Engineering & Technology)	B.Tech. (Civil) B.Tech. (EEE) B.Tech. (Mech.) B.Tech. (ECE) B.Tech. (CSE) B.Tech. (CHEM) B.Tech. (IT)
PG Programs (Engineering & Technology)	M.Tech. (Structural Engineering) M.Tech. (Power Systems) M.Tech. (PDM) M.Tech. (VLSI) M.Tech. (CN&IS)
Other PG Programs	MBA
Research Programs	Ph.D. in Civil, EEE, MECH, ECE, CSE, CHEM, MBA and MATHS

6. DISTRIBUTION AND WEIGHTAGE OF MARKS:

B.Tech.:

a). All Theory courses will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment:

Subjective tests	- 20 Marks
Objective tests	- 10 Marks
Assignments	- 10 Marks

- Two subjective tests shall be conducted.
- Each subjective test shall be conducted for 90 Minutes and have 3 questions each for 7 marks (No choice) and the same shall be scaled down to 20 Marks.
- Average of two subjective tests shall be considered.
- Two objective tests (online) shall be conducted each for 20 marks.
- Each objective test shall be conducted for 20 minutes and have 20 Multiple Choice Questions each for 1 mark and the same shall be scaled down to 10 Marks.
- Average of two objective tests shall be considered.
- Assignments shall be assessed for 10 marks.

External Assessment:

- External examination is for 60 marks (180 min). Question paper contains 10 questions (2 questions from each unit) and each question carries 12 marks. Student shall answer 5 questions (1 question from each unit).

b). **Laboratory/Practice:**

All Laboratory/Practice courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

- Continuous assessment for 15 marks for each experimental session finally averaged to 15 marks.
- Project based learning shall be assessed for 15 Marks.
- In Project based learning, a student has to identify a problem such that at least 3 or 4 modular learning of experiments shall be integrated and submit comprehensive report with solution at the end of the semester.
- An internal assessment test conducted at the end of the semester shall be assessed for 10 marks.

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Both internal and external examination shall include assessment of the student on
    a) Knowledge of principles/concepts involved
    b) Experimental design
    c) Result interpretation and analysis
    d) Experimental report

c). **Drawing/Design/Estimation:**

i) Computer Aided Engineering Graphics:

Evaluation Procedure:

The course will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Question paper contains 3 questions (with internal choice). **E**ach question carries 20 marks (5 marks for free hand drawing and list of commands & 15 marks for final drawing prepared in AUTOCAD). A Student shall answer all questions.

ii) Modeling and Assembly of Mechanical Elements:

Evaluation Procedure:

The course will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Semester End Examination shall include assessment of the student on Final drawings like modeling, assembly and drafting.
- Student is expected to execute one exercise.
- Final drawings like modeling, assembly and drafting hard copies shall be evaluated by both internal and external examiners

Integrated Course (Theory + Lab):

Theory and Lab shall be assessed for 200 Marks (Each 100 marks)

- For Integrated course, the theory shall be assessed for 100 marks, of which 40 marks for internal assessment and 60 marks for semester end external examination.
- The Lab shall be assessed for 100 marks , of which, 40 marks for internal assessment and 60 marks for semester end external examination

Socially Relevant Project:

- A student shall identify and provide a solution to the problem relevant to society/Profession/Industry.
- A student shall engage at least 15 hours on socially relevant project. Socially relevant project shall be evaluated internally for 50 marks by Project Review Committee (PRC). PRC comprising of HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide shall review the progress.

Mini Project:

- A student shall undergo internship for a period of 4 weeks/provide solution to the problem relevant to Industry/ Modern tool during the vacation after VI semester and submit comprehensive report.
  - Mini project shall be evaluated internally for 50 marks by Project Review Committee (PRC).
  - PRC shall prepare rubrics for assessment.

Project Evaluation:

Project is divided into 2 phases – Phase I & Phase II

- Evaluation shall comprise of internal and external assessment.
  Internal: 110 (Phase I 50 marks, Phase II 60 Marks)
  External: 90
- A project Review committee (PRC) comprising of HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide shall review the progress once in four weeks.

Project Phase I:

- Project Phase I shall be evaluated internally by PRC for 50 Marks.
- A student shall undertake project phase I during the VII semester.
- A student shall report to the guide/external supervisor and work under his supervision at least 2 hours per week.
- Assessment shall be on
  - Literature review
  - Identification and statement of the Problem

Project Phase II:

- A student shall undertake project phase II during the VIII semester.
- A student shall report to the guide/external supervisor and work under his supervision at least 8 hours per week.
- Internal evaluation shall be done by HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide for 60 marks.
- External evaluation shall be done by HoD, Guide/Internal Examiner and External Examiner for 90 marks.
- Assessment shall be on
  a) Review on fundamental knowledge involved
  b) Inter disciplinary aspect
  c) Experimental/methodology design
  d) Result analysis and interpretations
  e) Report writing
  f) Team work
  g) Presentation
  h) Viva-voce

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2^{nd}, 3^{rd} and 4^{th} years of study shall be same as applicable to regular B.Tech students.

7. ATTENDANCE REGULATIONS:

B.Tech.:

I. A student shall be eligible to appear for end semester examinations, if he or she acquires a minimum of 75% of attendance in aggregate of all the subjects (Theory & Lab.) for the semester.
II. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the college academic committee.
III. Shortage of attendance below 65% in aggregate of all the subjects (Theory & Lab) for the semester shall not be Condoned.
IV. Detained student shall seek re- admission for that semester when offered within 4 weeks from the date of commencement of class work.

PROMOTION RULE (Based on attendance):

- A Student shall be promoted to the next semester on fulfillment of minimum attendance requirement (75%) of current semester.

PROMOTION RULE (Based on credits):

- A student shall be promoted from IV semester to V semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to IV semester from the following examinations irrespective of whether the candidate takes the examination or not.
    - Two regular and Two supplementary examinations of I semester
    - Two regular and One supplementary examinations of II semester
    - One regular examination and One supplementary examination of III semester
    - One regular examination of IV semester.

- A student shall be promoted from VI semester to VII semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to IV semester from the following examinations irrespective of whether the candidate takes the examination or not.
    - Three regular and Three supplementary examinations of I semester
    - Three regular and Two supplementary examinations of II semester
    - Two regular and Two supplementary examinations of III semester
    - Two regular and One supplementary examinations of IV semester
    - One regular and One supplementary examination of V semester
    - One regular examination of VI semester.

B.TECH (Lateral Entry):

PROMOTION RULE (Based on attendance):

A Student shall be promoted to the next semester on fulfillment of minimum attendance requirement of current semester.

PROMOTION RULE (Based on credits):

A student shall be promoted from VI semester to VII semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to VI semester from the following examinations irrespective of whether the candidate takes the examination or not.

- Two regular and Two supplementary examinations of III semester
- Two regular and one supplementary examinations of IV semester
- One regular and One supplementary examinations of V semester
- One regular examination of VI semester.

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2nd, 3rd and 4th years of study shall be same as applicable to regular B.Tech students.

8. MINIMUM ACADEMIC REQUIREMENTS:

B.Tech.: (Theory/Lab)

i. A student is deemed to have satisfied the minimum academic requirements for a course on securing at least 24 marks out of 60 marks at semester end examination and overall minimum of 40 marks out of 100 marks including internal assessment.

ii. **Integrated Course (Theory + Lab):**

- The student shall secure minimum 24 marks out of 60 marks at semester end examination and overall 40 marks out of 100 marks for Theory and Laboratory courses independently. In case of failure in either theory or Laboratory course, the student should re-appear for both theory and laboratory.
- The assessment shall be done independently for both theory and laboratory courses and final marks shall be calculated on weighted average method for converting marks into grade points.

  Sample calculation:

  Integrated course-5 credits. Theory is for 3 credits and laboratory is for 2 credits.

  Total Marks obtained in theory: 70 out of 100 (3 Credits)

  Total Marks obtained in Lab : 90 out of 100 (2 Credits)

  Final marks of the integrated course is

  (70X3 + 90X2) / 5 = 78 Marks

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2nd, 3rd and 4th years of study shall be same as applicable to regular B.Tech students.

9. GRADING SYSTEM:

B.Tech. / B.Tech. (Lateral Entry)

Semester Grade Point Average (SGPA) for the current semester which is calculated on the basis of grade points obtained in all courses, except audit courses and courses in which satisfactory or course continuation has been awarded,

SGPA= Σ (course credits earned x Grade points) /
Σ (Total course credits in the semester.

CGPA= Σ (course credits earned x Grade points) up to successfully completed semesters / Σ (Total course credits up to successfully completed.

The UGC recommends a 10-point grading system with the following letter grades as

given below:

O	(Outstanding)	10
A+	(Excellent)	9
A	(Very Good)	8
B+	(Good)	7
B	(Above Average)	6
C	(Average)	5
P	(Pass)	4
F	(Fail)	0
Ab	(Absent)	0

- iii. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X10 = 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			**139**

Thus, **SGPA** =139/20 = 6.95

Illustration for CGPA

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
Credits: 16	Credits: 18	Credits: 25	Credits: 21	Credits: 23	Credits: 22
SGPA: 7.9	SGPA: 7.8	SGPA: 7.6	SGPA: 8.0	SGPA: 8.3	SGPA: 8.6

Semester 7	Semester 8
Credits: 21	Credits:14
SGPA: 8.2	SGPA: 8.5

Thus,

CGPA= $\frac{16x7.9 + 18x7.8 + 25x7.6 + 21x8.0 + 23x8.3 + 22x8.6 + 21x8.2 + 14x8.5}{160}$ = **8.1**

10. ELIGIBILITY FOR AWARD OF DEGREE:

B.Tech:

A student shall be eligible for award of the degree if he/she fulfills the following conditions:

1) Successfully completes all the courses prescribed for the Program.
2) CGPA greater than or equal to 4.5(Minimum requirement for Pass),

11. AWARD OF CLASS:

B.Tech:

Eligible Candidates for the award of B.Tech., Degree shall be placed in one of the following Classes based on CGPA.

Class	CGPA
Distinction	≥ 7.5
First Class	≥ 6.5
Second Class	≥ 5.5
Pass class	≥ 4.5

12. INSTRUCTION DAYS:

A semester shall have a minimum of 90 clear instruction days (including internal examinations).

13. Transfers from other Institutions shall not be permitted.

14. SUPPLEMENTARY EXAMINATIONS:

Supplementary examinations shall be conducted within 4 weeks from the date of announcement of results of regular examinations.

15. WITHHOLDING OF RESULTS: The result of a student shall be withheld

- If the student has not paid the dues, if any, to the institution
- If any case of pending disciplinary action ,
- Involvement in any sort of malpractices etc.
- Involvement in ragging.

16. TRANSITORY REGULATIONS:

A Candidate shall be readmitted from University regulations to A1 regulations or from A1 regulations to A2 regulations as per the guide lines of JNTUK.

17. AMENDMENTS TO REGULATIONS:

The Academic Council of MVGR College of Engineering (Autonomous) reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations, and/ or Syllabi or any other such matter relating to the requirements of the program which are compatible to the contemporary/emerging trends effectively meeting the needs of society/industry/stake holding groups.

18. Regulations for MALPRACTICES during the conduct of examinations

	Nature of Malpractices/Improper conduct	Punishment
1 (a)	If the candidate possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only. *
(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. *

2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled. *
3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider/candidate not on rolls, he will be handed over to the police and a case is registered against him. *
4	If the candidate mishandles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. Also if the answer script is mutilated / damaged disturbing the shape, of the script, answers, the bar code intentionally.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. He shall be debarred from class work and all examinations and be allowed to reregistered for the next subsequent odd or even semester only. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.*

5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	The same should be brought to the notice of CE who in turn in consultation with malpractice committee makes decision for cancellation of the performance in that subject. *
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. *
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. *
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. *

9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. *
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. *
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.*

*

19. General :

- Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
- The academic regulation should be read as a whole for the purpose of any interpretation.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

* * *

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

- Ragging within or outside any educational institution is prohibited.
- Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	 2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	 10 Months	+	Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE MVGR A RAGGING FREE CAMPUS

Ragging

ABSOLUTELY NO TO RAGGING

1. **Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.**
2. **Ragging entails heavy fines and/or imprisonment.**
3. **Ragging invokes suspension and dismissal from the College.**
4. **Outsiders are prohibited from entering the College and Hostel without permission.**
5. **Girl students must be in their hostel rooms by 7.00 p.m.**
6. **All the students must carry their Identity Cards and show them when demanded**
7. **The Principal and the Wardens may visit the Hostels and inspect the rooms any time.**

PROGRAM STRUCTURE

B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

SEMESTER - I						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2MAT001	Mathematics-I	3	-	-	3
2	A2CYI101	Engineering Chemistry (Theory + Lab)	3	-	3	5
3	A2EEI201	Basic Electrical Engineering (Theory + Lab)	3	-	3	5
4	A2EEW201	Work Shop	-	-	3	2
5	A2EHA701	Constitution of India	2	-	-	0
Total Number of Credits						15

SEMESTER - II						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2MAT102	Mathematics-II	3	-	-	3
2	A2PYI102	Applied Physics (Theory + Lab)	3	-	3	5
3	A2CII201	Programming for Problem Solving (Theory + Lab)	3	-	3	5
4	A2MED201	Computer Aided Engineering Graphics	1	-	4	3
5	A2EHL001	English-I	1	-	3	3
Total Number of Credits						19

SEMESTER - III						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2MAT107	Mathematics-III	3	-	-	3
2	A2EHL002	English II	2	-	2	3
3	A2EET301	Electromagnetic Field Theory	3	-	-	3
4	A2EEI202	AI Tools, Techniques & Applications	3	-	3	5
5	A2EEI301	Electrical Circuit Analysis	3	1	2	5
6	A2EEI302	Electronic Devices & Circuits	3	-	2	4
7	A2EET302	Digital Electronics	3	-	0	3
8	A2EHA702	Indian Traditional Knowledge	2	-	-	0
Total Number of Credits						26

SEMESTER - IV						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2MAT109	Mathematics-IV	3	-	-	3
2	A2XXT101	Biology for Engineers	3	-	-	3
3	A2EET303	Power Transmission & Distribution	3	-	-	3
4	A2EEI303	Electrical Machines - 1	3	-	2	4
5	A2EET202	Design Thinking & Product Innovation	2	-	2	3
6	A2EEI304	Control Systems	3	-	2	4
7	A2CHA701	Environmental Science	2	-	-	0
Total Number of Credits						20

SEMESTER - V						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2EET201	Internet of Things	2	-	2	3
2	A2EEI305	Electrical Machines - 2	3	-	3	4.5
3	A2EEI306	Power Electronics	3	-	3	4.5
4	A2EET401	Signals & Systems	3	-	0	3
	A2EEI401	MATLAB Programming	2		2	
	A2EET402	Electrical Wiring Design & Estimation	3		0	
5	A2XXT5XX	Open Elective – 1	3	-	-	3
6	A2XXT5XX	Open Elective – 2	3	-	-	3
7	A2EEP601	Socially relevant Project	-	-	2	1
Total Number of Credits						22

SEMESTER - VI						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2EET304	Power System Analysis	3	1	-	4
2	A2EEI307	Microprocessors & Microcontrollers	3	-	2	4
3	A2EEI308	Electrical Measurements & Instrumentation	3	-	2	4
4	A2EET403	Utilization of Electrical Energy	3	-	-	3
	A2EET404	Linear System Analysis				
	A2EET405	Advanced Control Systems				
5	A2EET406	Digital Signal Processing	3	-	-	3
	A2EET407	HVDC Transmission				
	A2EET408	Energy Audit, Conservation & Management				
6	A2MST001	Managerial Economics & Financial Analysis	3	-	-	3
7	A2EEP602	Mini Project	-	-	4	2
Total Number of Credits						23

SEMESTER - VII						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2EET305	Switchgear & protection	3	-	-	3
2	A2EET306	Power Semiconductor Drives	3	1	-	4
3	A2EEI402	Programming with Lab VIEW	2	-	2	3
	A2EET409	Renewable Energy Systems & Integration	3		-	
	A2EET410	Special Electrical Machines	3		-	
	A2EEI403	Embedded Processor	2		2	
4	A2EET411	Advanced Power Electronic Converters	3	-	-	3
	A2EET412	FACTS				
	A2EET413	Power System Operation & Control				
5	A2EET414	Electrical Distribution Systems	3	-	-	3
	A2EET415	Electrical Vehicle Technology				
	A2EET416	Condition Monitoring of Electrical Systems				
6	A2EHT001	Professional Ethics and Human Values	3	-	-	3
7	A2EEP603	Project phase - I	-	-	4	2
Total Number of Credits						21

SEMESTER – VIII						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2XXT5XX	Open Elective – 3 (MOOCS)	3	--	-	3
2	A2XXT5XX	Open Elective – 4 (MOOCS)	3	--	-	3
3	A2EEP604	Project Phase - II	-	--	16	8
Total Number of Credits						14

List of open Electives Offered by EEE Department:

S. No	Course Code	Name of the Course
1	A2EET501	Basic Control Systems
2	A2EET502	Applied Electrical Engineering
3	A2EET503	Electrical Safety
4	A2EET504	Concepts of Electrical Wiring
5	A2EET505	Basic Automation Course
6	A2EET506	Illumination Engineering

A2MAT101	SEMESTER - I	L	T	P	C
	MATHEMATICS-I (common to ALL branches)	3	0	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: LINEAR ALGEBRA-1

Rank of a matrix: Elementary row and column transformations, equivalent matrices, Echelon form of a matrix, calculation of rank by reducing the matrix to Echelon form. System of equations: Linear system of equations, homogeneous and non-homogeneous system of equations, consistency criteria, trivial and non-trivial solutions, solving system of equations by Rank method; Eigenvalues and Eigenvectors: Finding Eigenvalues and Eigenvectors, properties of Eigenvalues and Eigenvectors (statements) including spectral mapping theorem.

UNIT- II: LINEAR ALGEBRA-2

Cayley-Hamilton Theorem: Statement of the theorem and its verification. Applications: Finding higher powers of a matrix, finding matrix polynomials, finding inverse of matrix. Diagonal form of a matrix: Reduction to diagonal form, spectral and modal matrices, finding higher powers of a matrix using diagonalisation, Quadratic forms: Matrix form of quadratic forms, orthogonal transformation, canonical form, reduction of quadratic form to canonical form by orthogonal transformation method, rank, index, signature and nature (definiteness) of a quadratic form.

UNIT-III: FIRST ORDER DIFFERENTIAL EQUATIONS & APPLICATIONS

Outlines: Differential Equations(DEs), Order and degree of a DE, Formation of DEs, general solutions of a DE; Solving first order and first degree DEs: linear DEs, Bernoulli's DEs (reducible to linear), exact DEs, integrating factors, non-exact DEs (reducible to exact).

Applications to real world problems: Newton's law of cooling, laws of growth and decay, family of curves, orthogonality of families curves, orthogonal trajectories (Cartesian and polar curves).

UNIT-IV: HIGHER ORDER DIFFERENTIAL EQUATIONS

Differential equations of higher order: Linear differential equations of higher order, its operator form. Solution concepts: General (complete) solution, particular solution. Solution of linear differential equations of higher order: Auxiliary equations, rules for finding complementary functions, rules for finding particular integrals (general and special methods).

UNIT-V: LAPLACE TRANSFORMS

Laplace transformation: Laplace transformation of elementary functions, Properties: Linearity, change of scale, first shifting properties, finding Laplace transformations using properties, Advanced properties: Laplace transformations of derivatives and integrals, multiplication by t^n, division by t (statements), finding Laplace transformations

using advanced properties; Inverse Laplace transformations: Finding inverse Laplace transformations using partial fractions, statement of Convolution theorem, finding inverse Laplace transformations by Convolution theorem; Applications: Solving Initial Value Problems by using Laplace transformations.

//Topics prefixed with 'outlines / overview' are not for assessment//

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017
2. T.K.V. Iyengar et al, Engineering Mathematics, S. Chand Publishers, Revised edition

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010
3. T. Veerarajan, Higher Engineering Mathematics, Tata McGraw-Hill, 2008

COURSE OUTCOMES: Learners at the end of this course will be able to

CO 1	KO#1	Recall the concepts of Linear algebra
CO 2	KO#2	Recall the solution methods and applicability of first order differential equations
CO 3	KO#3	Recall the solution methods of higher order differential equations and the concepts of Laplace transforms
CO 4	UO#1	Use and interpret the concepts of linear algebra
CO 5	UO#2	Use and interpret solution methods and applicability of first order differential equations
CO 6	UO#3	Use and interpret solution methods of higher order differential equations and the concepts of Laplace transforms
CO 7	AO#1	Apply the concepts of linear algebra, differential equations and Laplace transformation to model and solve real world problems

CO/PO Mapping

Course Title:	Mathematics-I (Common to ALL Branches)													
Course Code:	A2MAT101													
Course Designed by	Dept. of Mathematics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2							2			
CO2	3	3		2							2			
CO3	3	3		2							2			
CO4	3	3		2							2			
CO5	3	3		2							2			
CO6	3	3		2							2			
CO7	3	3		2							2			

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 06.07.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CYI101	SEMESTER - I	L	T	P	C
	ENGINEERING CHEMISTRY (Common to all branches)	3	--	2	5
	Total Contact Hours – 48				

SYLLABUS

UNIT 1: WATER TECHNOLOGY

Introduction –Soft Water and hardness of water, Estimation of hardness by EDTA Method - Boiler troubles - Industrial water treatment – specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, zeolite and ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.

UNIT 2: POLYMERS

Introduction to polymers, functionality of monomers, addition and condensation polymerization, copolymerization, stereospecific polymerization with specific examples. Thermoplastics and Thermo-sets – their differences.

Elastomers – applications with specific examples- Preparation, properties and uses of PVC, Bakelite, Teflon and Nylon-6, 6, Buna-S and Thiokol rubber- Fibre reinforced plastics – carbon fibre, glass fibre and aramids.

UNIT 3: ELECTROCHEMISTRY AND APPLICATIONS

Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations.
Primary cells –dry cell- Secondary cells – lead acid, nickel-cadmium and lithium ion batteries- working of the batteries including cell reactions- Fuel cells, hydrogen-oxygen, and methanol fuel cells – working of the cells.
Corrosion: Introduction to corrosion, mechanism of dry and wet corrosion, Pilling Bedworth ratios and uses, Types of corrosion – Differential aeration corrosion, galvanic corrosion, pitting corrosion, waterline corrosion and stress corrosion, Factors affecting the rate of corrosion – metal based factors and environmental based factors, protection techniques – metal coatings – galvanization and tinning, cathodic protection, inhibitors – cathodic and anodic, organic coatings – paints – constituents and their functions.

UNIT-4: CHEMISTRY OF ADVANCED MATERIALS

NANOMATERIALS: introduction- synthesis of Nano material by sol gel method- CVD-engineering applications of Nano materials

CEMENT: Introduction to ordinary Portland cement- manufacturing of OPC- setting and hardening of cement- decay of cement.

FUELS: Introduction- classification- liquid fuels- cracking- knocking- octane number and cetane number; Lubricants- definition- mechanism and properties of lubricants

UNIT 5: INSTRUMENTAL METHODS AND APPLICATIONS

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle, instrumentation (Block diagram and working), applications of UV, IR and NMR spectroscopic methods. Chromatography- introduction- Ion exchange chromatography-applications

COURSE OUTCOMES:

CO1: The student will have the ability to describe softening methods and desalination processes. He/ She will be able to explain various types of polymers; preparation, properties and engineering applications of thermoplastic, thermosetting plastics, rubbers and FRP's.

CO2: The student will have the ability to describe electrochemical reactions, principles of batteries, fuel cell and corrosion.

CO3: The student will have the ability to outline electromagnetic spectrum and explain the working principles of IR, UV, NMR and chromatographic techniques. The student describes the synthesis, properties and applications of nanomaterials, cement. HE/ She Outlines the cracking methods, knocking of fuels.

CO4: The student will have the ability to differentiate between hard and soft water, demineralization and deionization processes and thermosetting – thermoplastic materials.

CO5: The students will have the ability to give examples on primary and secondary batteries, various types of corrosion, methods of corrosion prevention.

CO6: The student will have the ability to draw inferences on the principles and applications of various instrumental methods and also can compare and contrast between cracking methods.

CO7: The student will have the ability to analyze water samples and validate the results obtained and apply their knowledge on polymers, batteries, materials and instrumentation.

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

Reference books:

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. H.Kaur, Instrumental Methods of chemical analysis, Pragathi Prakashan, 2012.
3. Chemistry for Engineers, Teh Fu Yen, Imperial college press, London

CO/PO Mapping

Course Title:	Engineering Chemistry													
Course Code:	A2CYI101													
Course Designed by	Dept. of Chemistry													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								2			1		
CO2	3								2			1		
CO3	3								2			1		
CO4	3								2			1		
CO5	3								2			1		
CO6	3								2			1		
CO7	3								2			1		

Course designed by	DEPARTMENT OF CHEMISTRY
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

Engineering Chemistry - Laboratory

List of Experiments:

1. Determination of HCl using sodium carbonate
2. Determination of Hardness of a groundwater sample.
3. pH metric titration of strong acid vs. strong base
4. Condcutometric titration of Strong acid VS Strong base
5. Condcutometric titration of Weak acid VS strong base
6. Potentiometric titration of Fe(II) with potassium dichromate
7. Determination of Strength of an acid in Pb-Acid battery
8. Preparation of a polymer
9. Determination of viscosity of polymer solution using survismeter
10. Determination of percentage of Iron in Cement sample by colorimetry
11. Estimation of Calcium oxide in port land Cement
12. Preparation of Nanomaterials (ex: Fe/ Zn/ Ferrite)
13. Adsorption of acetic acid by charcoal
14. Determination of acid value and saponification value of a given lubricant
15. Project based learning (Mandatory for all students)

Course Outcomes:

CO1: The student will be able to determine total hardness, strength of acid in a lead acid battery, calcium in Portland cement using volumetric analysis

CO2: The student will be able to explain condcutometric, potentiometric, pH metric titrations and colorimetric determination.

CO3: The student will be able to explain the synthesis of a polymer, nanomaterials

CO/PO Mapping

Course Title:	Engineering Chemistry													
Course Code:	A2CYI101													
Course Designed by	Dept. of Chemistry													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		1			1				1	1	2		
CO2	3		1			1				1	1	1		
CO3	3		1							1	1	1		

Course designed by	DEPARTMENT OF CHEMISTRY
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2EEI201	SEMESTER – I	L	T	P	C
	Basic Electrical Engineering (Common to all branches)	3	1	2	5
	Total Contact Hours – 50				

SYLLABUS

UNIT 1: D.C. CIRCUITS

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, Analysis of simple circuits with DC excitation, Superposition, Thevenin's and Norton's Theorems, Time-domain analysis of first-order RL and RC circuits.

UNIT 2: A.C. CIRCUITS

Representation of sinusoidal waveforms, Average and RMS values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase AC circuits (Series & Parallel), Resonance, Three-phase balanced circuits, voltage and current relations in star and delta configurations.

UNIT 3: DC & AC MACHINES [ELEMENTARY TREATMENT ONLY]

Principle and operation of DC Generator - EMF equation – open circuit characteristic of DC shunt generator – principle and operation of DC Motor – Types of DC Motors – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of single-phase Transformer - OC and SC tests on transformer - principle and operation of single phase & Three phase Induction Motors, construction and working of synchronous motors

UNIT 4: BASICS OF POWER SYSTEMS:

Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.

UNIT 5: ELECTRICAL INSTALLATIONS

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Types of Batteries, Characteristics of Batteries. Elementary calculations for energy consumption, power factor improvement, battery backup.

TEXT BOOK/ REFERENCES:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010
2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
3. Vincent Del Toro, "Electrical Engineering Fundamentals", Pearson, 2015.

COURSE OUTCOMES:

At the end of the course, Student will be able to

CO1. To recall fundamental concepts of electrical circuits such as charge, voltage, current and power.
CO2. Describe the principle of operation of D.C. & A.C. machines.
CO3. Outline the working operation of various generating stations.
CO4. Explain the procedure for solving circuits with A.C and D.C. Excitation
CO5. Summarize the performance characteristics of different machines.
CO6. Explain about different equipment used in power industry
CO7. Apply the fundamental laws, associated with Basic Electrical Engineering to solve real world problems in the field of Engineering

CO/PO Mapping

CO / PO mapping	Program Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
To recall fundamental concepts of electrical circuits such as charge, voltage, current and power.	3	3	1	1			3			1			1	1
Describe the principle of operation of D.C. & A.C. machines.	3	2	2	2	2					1			1	1
Outline the working operation of various generating stations.	3	3	3	1	1		1			1			1	1
Explain the procedure for solving circuits with A.C and D.C. Excitation	3	3	2	1	1		2			1			1	1
Summarize the performance characteristics of different machines.	3	3	2	1	1	3	1			1			1	1
Explain about different equipment used in power industry	3	3	2	1		2	2			1		1	3	2
Apply the fundamental laws, associated with Basic Electrical Engineering to solve real world problems in the field of Engineering	3	3	3	3	3	2	2			2		3	3	3

Course designed by	Department of Electrical & Electronics Engineering
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

Basic Electrical Engineering Laboratory

LIST OF EXPERIMENTS

Basic safety precautions, Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope, resistors, capacitors and inductors.

1. Verification of Kirchhoff laws.
2. Verification of Network Theorems.
3. Magnetization characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. Predetermination of performance parameters of 1 – Phase Transformer.
6. I – V Characteristics of Solar PV cell
7. Brake test on DC Shunt Motor.
8. Measurement of earth resistance.
9. Measurement of reactive power in three phase balanced circuit.
10. Measurement of Choke coil parameters
11. Brake test on 3 - Phase Induction Motor.
12. Determination of AC quantities using CRO/DSO.
13. I – V characteristics of battery.

COURSE OUTCOMES:

At the end of the course, Student will be able to

CO 1. Identify common electrical equipment used in laboratory.(L1)

CO 2. Estimate the ratings of different equipment used to perform an experiment. (L2)

CO 3. Demonstrate the usage of various electrical measuring instruments.(L3)

CO 4. Analyze the characteristics of rotating & stationery electrical machines (L4).

CO 5. Interpret the characteristics of PV cell and Battery.(L5)

CO/PO Mapping

CO / PO Mapping	Program Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
Identify common electrical equipment used in laboratory.	3		1	1	3	1			3	2	2	2	2	1
Estimate the ratings of different equipment used to perform an experiment.	3	2	3	3	3	2	1		3	3	2	2	2	3
Demonstrate the usage of various electrical measuring instruments.	2	2	2	2	3	1			3	3	1	2	2	1
Analyze the characteristics of rotating & stationery electrical machines.	3	3	3	3	2				3	3		2	3	2
Interpret the characteristics of PV cell and Battery.	3	3	3	3	3		1		3	3	2	2	3	3

Course designed by	Department of Electrical & Electronics Engineering
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2EEW201	SEMESTER - I	L	T	P	C
	ENGINEERING WORKSHOP (Electrical)	0	-	3	2
	Total Contact Hours – 45				

1. Introduction to Electrical quantities, tools, symbols and elements.
2. Study of different sizes of wires and their current ratings.
3. Identification of colour code, resistors, ICs, Transistors, capacitors, diodes, SCRs, IGBTs etc.
4. To perform Stair case wiring
5. Load calculation for an Installation & Design of residential house wiring using fuse, switch, lamp and MCB.
6. Practice of Soldering and De-soldering.
7. Fluorescent Lamp Wiring
8. Ceiling Fan Wiring and Capacitor testing.
9. Simple relay connection using push buttons, NO, NC contacts
10. Measurement of Amplitude, Time Period and Frequency using CRO.
11. Measurement of Effective Voltage and Currents in Series and Parallel connected Batteries.
12. Measurement of Voltage, Current and Power

Course Outcomes Student will be able to

1. List different tools used in electrical workshop and learn the usage of tools (L1)
2. Demonstrate soldering and desoldering (L2)
3. Check ratings of commonly used house hold electrical appliances. (L3)
4. Analyze the load pattern for a building consisting of lamp, fan etc., (L4)
5. Design wiring schemes for various schemes such as staircase, residential building (L6)

CO / PO mapping	Program Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
List different tools used in electrical workshop and learn the usage of tools	3	3		1	3		1				1	1	2	2
Demonstrate soldering and desoldering					3		2		3			3	1	1
Check ratings of commonly used house hold electrical appliances.	3	3	3	3	2		1		2	2	3	2	3	2
Analyze the load pattern for a building consisting of lamp, fan etc.,	3	3	3	3	2	1	1		2	1	2	2	2	2
Design wiring schemes for various schemes such as staircase, residential building.	3	3	3	2	2	1	1		2	1	2	2	3	2

Course designed by	Department of Electrical & Electronics Engineering
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2EHA701	SEMESTER - I	L	T	P	C
	CONSTITUTION OF INDIA	2	-	-	0
	Total Contact Hours – 30				

SYLLABUS

UNIT – I: HISTORY OF MAKING OF THE INDIAN CONSTITUTION

History - Drafting Committee, (Composition & Working)

UNIT – II: PHILOSOPHY OF THE INDIAN CONSTITUTION: Preamble - Salient Features

UNIT-III: CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES: Fundamental Rights -Right to Equality -Right to Freedom -Right against Exploitation -Right to Freedom of Religion -Cultural and Educational Rights -Right to Constitutional Remedies ; Directive Principles of State Policy ; Fundamental Duties.

UNIT-IV: ORGANS OF GOVERNANCE: Parliament -Composition - Qualifications and Disqualifications - Powers and Functions - Executive - President - Governor - Council of Ministers; Judiciary, Appointment and Transfer of Judges, Qualifications.

UNIT – V: LOCAL ADMINISTRATION: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayati raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat : Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

TEXT BOOK:
Reference Source compilation

REFERENCES:
1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.

COURSE OUTCOMES:

CO1.	Students will be able to discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO2.	Students will be able discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
CO3.	Students will be able to discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP]under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
CO4.	Students will be able to discuss the passage of the Hindu Code Bill of 1956.
CO5.	Students will be able to discuss the powers of Executive, Judiciary and Legislature.

CO/PO Mapping

Course Title:	Constitution of India (Common to ALL Branches)													
Course Code:	A2EHA701													
Course Designed by	Dept. of English & Humanities													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2								
CO2						2								
CO3						2								
CO4						2								
CO5						2								

Course designed by	DEPARTMENT OF ENGLISH & HUMANITIES
Approval	Approved by: Meeting of Board of Studies held on 23.06.15
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

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A2MAT102	SEMESTER - II	L	T	P	C
	MATHEMATICS-II (MEC,ECE,EEE,CHE & CIV)	3	0	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: NUMERICAL METHODS-1

Solving Algebraic and Transcendental Equations: Intermediate value theorem (statement), solution concepts, error in solution, measure of accuracy, approximate and exact solutions, Solution methods: Bisection method, Regula-Falsi method and Newton-Raphson Iterative method; Finite differences: Forward, backward and shift operators, relations among operators, Interpolation: Interpolation and extrapolation, data of equal and unequal intervals, Newton's forward and backward Interpolation formulae, Lagrange's interpolation formula, Fitting polynomials to the data by using Newton's and Lagrange's formulae, Inverse Interpolation by Lagrange's formula.

UNIT- II: NUMERICAL METHODS-2

Numerical Integration: Simpson's and Trapezoidal rules, Weddle's and Boole's rules of integrations; Numerical solutions of ordinary differential equations: Concepts of Initial Value Problem, Taylor's series method, Euler's method, Runge - Kutta method of fourth order; Predictor-corrector method: Milne's method to solve initial value problems.

UNIT-III: MULTIVARIABLE CALCULUS

Overview: Functions of two variables, limit and continuity, partial derivative and its geometrical meaning; Functions of several variables: Partial differential coefficients of higher order, total derivatives, Chain rules for partial differentiation, partial differentiation of Implicit functions; Jacobians: Jacobian and properties, chain rule, functional dependence, Jacobian of implicit functions

Maxima and Minima: Maxima and minima of a function of two variables, constrained maxima and minima, Lagrange's method of undetermined multipliers.

UNIT-IV: PARTIAL DIFFERENTIAL EQUATIONS -FIRST ORDER

Formation of PDEs: Elimination of arbitrary constants, Elimination of arbitrary functions; Solution concepts of PDEs: Complete solution / integral, particular integral, general integral and singular integral, PDEs solvable by direct integration; Linear PDEs of first order (Lagrange's linear equation): Method of grouping and method of multipliers; Nonlinear PDEs of first order: Solution methods of solving PDEs in standard forms I, II, III & IV (as is specified in Text Book 1).

UNIT-V: PARTIAL DIFFERENTIAL EQUATIONS -HIGHER ORDER

Homogeneous Linear Partial Differential Equations of second and higher order with constant coefficients: Symbolic form, Rules for finding complementary function, Rules for finding particular integral, working procedure to get complete solution; Solving

nonhomogeneous linear PDEs of second and higher order with constant coefficients; Method of separation of variables: concept of boundary value problem, solving boundary value problems by separating variables.

//Topics prefixed with 'outlines / overview' are not for assessment//

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017
2. T.K.V. Iyengar et al, Engineering Mathematics, S. Chand Publishers, Revised edition

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010
3. T. Veerarajan, Higher Engineering Mathematics, Tata McGraw-Hill, 2008

COURSE OUTCOMES: At the end of course, students shall be able to

CO1	Recall the concepts of numerical methods.
CO2	Recall the concepts of multivariable calculus.
CO3	Recall solution methods of PDEs.
CO4	Use the concepts of numerical methods to solve equations, do interpolation & numerical integration and also to solve ODEs numerically.
CO5	Use the concepts of multivariable calculus to find maxima & minima of a multivariable function.
CO6	Use solution methods of PDEs to solve BVPs.
CO7	Apply the concepts of numerical methods, multivariable calculus and PDEs to solve real world problems including BVPs.

CO/PO Mapping

Course Title:	MATHEMATICS-II (MEC,ECE,EEE,CHE & CIV)													
Course Code:	A2MAT102													
Course Designed by	Dept. of Mathematics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2							2			
CO2	3	3		2							2			
CO3	3	3		2							2			
CO4	3	3		2							2			
CO5	3	3		2							2			
CO6	3	3		2							2			
CO7	3	3		2							2			

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 06.07.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PYI102	SEMESTER – II	L	T	P	C
	APPLIED PHYSICS (Common to EEE,ECE,CSE & IT)	3	-	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: WAVE OPTICS **[10hrs]**

Interference: Introduction- Coherence– Young's double slit experiment- Theory of interference fringes- Interference in thin parallel film by reflection (under reflected light)- Newton's Rings- Applications.

Diffraction: Introduction **-** Fraunhofer diffraction at- Single slit– Double slit (qualitative)- Diffraction Grating.

Polarization: Introduction– Polarization by refection- Brewsters law- Double refraction– Nicol Prism– Theory of Plane, circular and elliptically polarized light – Quarter wave & Half wave plate

UNIT-II: MAGNETIC PROPERTIES OF MATERIALS **[8hrs]**

Introduction– Origin of Magnetic moment in atom– Classification of magnetic materials– Ferromagnetism- Weiss theory (qualitative)- Domain theory- Hysteresis- Soft & Hard magnetic materials- Ferrites- Garnets- Applications.

UNIT-III: DIELECTRIC PROPERTIES OF MATERIALS **[8hrs]**

Introduction– Types of Polarization- Electronic- Ionic- Orientation polarization– Internal field- Clausius Mossoiti relation- Frequency dependency of polarization- Dielectric loss- Loss Tangent- Ferro electricity- Piezoelectricity- P-E loop- Applications.

Unit-IV: HEAT TRANSFER **[10hrs]**

Transfer of heat energy- conduction, convection and radiation and their fundamental laws. Thermal expansion of solids and liquids - expansion joints -bimetallic strips. Heat conductions in solids- thermal conductivity - Forbe's and Lee's disc method: theory and experiment - applications (qualitative). Working principles of heat exchangers- refrigerators- ovens- solar water heaters.

UNIT–V: QUANTUM PHYSICS & SEMICONDUCTORS **[12hrs]**

Quantum Physics: Introduction- Matter wave– Davisson Germer Experiment- Schrodinger's wave equations– Wave function– Particle in potential box– Origin of energy bands.

Introduction- Intrinsic semiconductors– Carrier concentration (qualitative)– Electrical conductivity- Extrinsic semiconductors– Carrier concentration (qualitative)- Drift and Diffusion currents- Direct and Indirect band gap semiconductors- Light emitting diode– Solar cell- Hall effect- Applications.

TEXTBOOKS:

1. R.K.GAUR and S.L.GUPTA, Engineering Physics, Dhanpat Rai Publications

REFERENCES:

1. RESNICK, HALLIDAY and WALKER, Principles of Physics, Wiley Publishers
2. P.K. NAG, Heat and Mass Transfer, Mc Graw Hill Publishers.
3. B.K. PANDEY and S. CHATURVEDI, Engineering Physics, Cengage Learning Publishers.

COURSE OUTCOMES:

CO1. Student will be able to gain knowledge on basics of interference, diffraction and polarization of light.

CO2. Student will be able to gain knowledge on fundamentals of magnetic properties of materials and the polarization mechanisms of dielectrics.

CO3. Student will be able to gain knowledge on modes of heat transfer and the essentials of quantum physics & semiconductors for engineers.

CO4. The students will be able to understand and recognize the principle behind working of optical devices.

CO5. The students will be able to understand and recognize the underlying property behind working of electric and magnetic components in devices.

CO6. The students will be able to understand and recognize the importance of heat transfer and quantum mechanics based semiconductor devices.

CO7. The students will have the ability to apply the conceptual knowledge of principles of quantum physics in designing and developing engineering applications.

CO/PO MAPPING:

Course Title:	Applied Physics (EEE)													
Course Code:	A2PYI102													
Course Designed by	Dept. of Physics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3						1				1		
CO2	3	3						1				1		
CO3	3	3						1				1		
CO4	3	3						1				1		
CO5	3	3						1				1		
CO6	3	3						1				1		
CO7	3	3						1				1		

Course designed by	DEPARTMENT OF PHYSICS
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PYI102	SEMESTER – II	L	T	P	C
	APPLIED PHYSICS LAB	-	-	3	2
	Total Contact Hours – 42				

LIST OF EXPERIMENTS

1.	Determination of the radius of curvature of the plano-convex lens by Newton's Rings method.
2.	Determination of the thickness of the thin object (hair/paper) by Wedge method.
3.	Determination of the prominent spectral line wavelengths in mercury spectrum by normal incidence method.
4.	Obtain the signature variation of the axial magnetic field for a circular coil carrying current.
5.	Estimation of the hysteresis loss for a ferromagnetic material.
6.	Determination of thermal conductivity coefficient of the disc shaped material.
7.	Determination of energy band gap of the semiconductor by using junction diode.
8.	To plot I/V Characteristics of Zener diode.
9.	Determination of temperature coefficient of the thermistor.
10.	To plot frequency response characteristics of the L.C.R series circuit.

TEXTBOOKS:

1. BALASUBRAMANIAN.S, SRINIVASAN.M..N, A Text book of Practical Physics, S Chand Publishers, 2017

REFERENCES:

1. https://vlab.amrita.edu.

COURSE OUTCOMES:

CO1. Design experiments to demonstrate and investigate the interference and diffraction patterns of light.

CO2. Design experiments for signature variation of magnetic field due to current and the hysteresis loss in magnetic materials.

CO3. Design experiment to determine the thermal conductivity coefficient (K) of a material.

CO4. Design L.C.R series circuits for desired applications based on their frequency response characteristics.

CO5. Design experiments for determining the physiognomies of the semiconductor devices like the energy band gap, breakdown voltage and coefficient of resistance.

CO/PO MAPPING:

Course Title:	Applied Physics Lab													
Course Code:	A2PYI102													
Course Designed by	Dept. of Physics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3						1	2	1		1		
CO2	3	3						1	2	1		1		
CO3	3	3						1	2	1		1		
CO4	3	3						1	2	1		1		
CO5	3	3						1	2	1		1		

Course designed by	DEPARTMENT OF PHYSICS
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CIT201	SEMESTER – II	L	T	P	C
	PROGRAMMING FOR PROBLEM SOLVING	3	0	0	3
	Total Contact Hours : 54				
	Prerequisites: Mathematics				

COURSE OBJECTIVES	
COBJ1.	Students will study systematic approach to problem solution specification using finite number of unambiguous steps.
COBJ2.	Students will gain understanding of procedural language features using C as the template.
COBJ3.	Students will read and analyse alternative construct choices in procedural language C.
COBJ4.	Students will get exposure to systematic approach of automated solution design, implementation and testing using a procedural language.

SYLLABUS

UNIT – I: [9 HOURS]

INTRODUCTION: Introduction to Programming, Computer System, Hardware and Software concepts.

PROBLEM SOLVING: Algorithm, Pseudo-code, flow-chart, program development steps, high-level, Assembly and machine languages.

BASICS OF C PROGRAMMING: Structure of C program, identifier, basic data types and sizes, constants, variables, arithmetic operators, relational operators, logical operators, increment and decrement operators, assignment operator, conditional operator, scanf and printf built-in functions, Creating and running programs.

UNIT – II: [9 HOURS]

BIT-WISE OPERATORS: logical, shift, rotation, masks.

EXPRESSIONS: expressions, type conversions, conditional expressions, precedence and order of evaluation.

SELECTION: Two-way selection: if-else, nested if, examples, multi-way selection: switch, else-if, examples.

ITERATIVE: loops - while, do-while and for statements, break continue, event and counter controlled loops.

UNIT – III: [18 HOURS]

Part – I: [9 HOURS]

ARRAYS: Arrays (1-D, 2-D), Character arrays and Strings, Searching (Linear Search and Binary Search).

Part – II: [9 HOURS]

BASIC ALGORITHMS: Basic Sorting Algorithms (Bubble, Insertion and Selection), comparing algorithms for complexity.

FUNCTIONS: Functions, Scope and Extent of Variables, Function Parameters, parameter passing using call-by-value, sub-routines, Storage Classes,#define,#ifdef, #ifndef pre-processor directives.

UNIT – IV: [9 HOURS]

RECURSION: Definition of Recursion, example programs using recursion like finding Factorial, Fibonacci series, Quick sort, puzzle solving using recursive functions (towers of hanoi, ackerman function).

POINTERS: Definition of Pointers, Pointer Type, Pointer Arithmetic, Function parameter passing using call-by-reference.

MEMORY ALLOCATION: Difference between static and dynamic memory allocation, dynamic memory allocation using built-in functions, dangling pointer, unreferenced memory problem.

UNIT – V: [9 HOURS]

ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, bit-fields, concept of linked list, program applications.

FILE-HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, command line arguments.

Suggested Text Books

1. Programming For Problem Solving, Behrouz A.Forouzan & Richard F.Gilberg, Cengage Publishers, 3rd Edition
2. Programming In C:A Practical Approach, Ajay Mittal, Pearson Education

Suggested Reference Books

1. Brian W. Kernighan And Dennis M. Ritchie, The C Programming Language, Prentice Hall Of India
2. Introduction To C Programming, Reema Thareja, Oxford University Press
3. E. Balaguruswamy, Programming In Ansi C, Tata Mcgraw-Hill

COURSE OUTCOMES

The student will

1. Have the ability to **describe** a formal algorithmic solution for the given problem, **list** the features of C including scalar & vector data types, operators, **Outline** expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.

2. Have the ability to **describe** one and two-dimensional arrays, **outline** loops and arrays for searching and **describe** various sorting techniques.

3. Have the ability to **outline** the purpose of functions, pointers, command line arguments, dynamic memory allocation. **Define** storage classes. **Describe** command like arguments, structures, unions, and enumeration. Have knowledge of handling files.

4. Have the ability to **solve** complex expressions, **design** algorithms and **develop** programs in C language using the basic constructs, data types, operators, control & iterative statements, and arrays.

5. Have the ability to **apply** arrays to solve complex matrix related problems and strings. **Compare and contrast** various searching and sorting techniques for complexity.
6. Have the ability to **distinguish between** function call types. **Draw inferences on** command line arguments, storage classes, and pre-processor directives. **Use** pointers with functions, arrays, strings, to **solve** complex problems. **Give example** and **solve** classical recursion problems**. Compare and contrast** static and dynamic memory allocation, and **apply** them. **Use** structures and unions to implement and **solve** real-time problems. **Apply** file related functions to process files.

7. Have the ability to **Fully appreciate** the art of procedural programming in C and develop programs **optimally** using the full feature set of C language.

Course Title:	Programming for problem solving (Common to ALL Branches)														
Course Code:	A2CIT201														
Course Designed by	Dept. of Computer Science and Engineering														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSOM	PSON	PSOO
CO1	3	3						3	2	1		2	1	1	1
CO2	3	3						3	2	1		2	1	1	1
CO3	3	3						3	2	1		2	1	1	1
CO4	3	3	3	3	3	3	3	3	2	1	1	2	3	3	3
CO5	3	3	3	3	3	3	3	3	2	1	1	2	3	3	3
CO6	3	3	3	3	3	3	3	3	3	1	1	2	3	3	3
CO7	3	3	3	3	3	3	3	3	3	1	1	3	3	3	3

Levels of Correlation: High-3, Medium-2, Low-1

PROGRAMMING FOR PROBLEM SOLVING PRACTICE

COURSE OBJECTIVES	
1.	To use basic data types, operators, expressions and expression evaluation mechanisms using C Programming Language.
2.	To implement control flows construct in C Programming Language and understand the syntax, semantics and usability contexts of these different construct.
3.	To develop composite data types in C and constructs available to develop their data-types, utilize them to model things and dealing with data from and to external files.
4.	To design programs with different variations of the constructs available for practicing modular programming and understand the pros and cons of using different variants and apply optimization.

UNIT – I

WEEK 1:

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using computers
Lab1: Familiarization with programming environment

i) Exposure to Turbo C, gcc, Code Blocks IDE
ii) Writing simple programs using printf(), scanf()

WEEK 2:

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments/Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts
Lab1: Converting algorithms/flowcharts into C Source code

Developing the algorithms/flowcharts for the following sample programs

i. Sum and average of 3 numbers
ii. Conversion of Fahrenheit to Celsius and vice versa
iii. Simple interest calculation

WEEK 3:

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:
Lab 3: Simple computational problems using arithmetic expressions

i) Finding the square root of a given number
ii) Finding compound interest
iii) Area of a triangle using heron's formulae
iv) Distance travelled by an object

UNIT – II

WEEK 4:

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and their precedence and associativity:
Lab 4: Simple computational problems using the operator's precedence and associativity

i) Evaluate the following expressions
   a. A+B*C+(D*E)+F*G
   b. A/B*C-B+A*D/3
ii) a. A+++B---A
   b. J=(i++)+(++i)
iii) Find the maximum of three numbers using conditional operator
iv) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5:

Objective: Explore the full scope of different variants of "if construct" namely if-else, null-else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures

i) Write a C program to find the max and min of four numbers using if-else
ii) Write a C program to generate electricity bill
iii) Find the roots of the quadratic equation
iv) Write a C program to simulate a calculator using switch case
v) Write a C program to find the given year is a leap year or not

WEEK 6:

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops:
Lab 6: Iterative problems e.g., the sum of series

i) Find the factorial of given number using any loop
ii) Find the given number is a prime or not
iii) Compute sine and cos series
iv) Checking a number palindrome
v) Construct a pyramid of numbers

UNIT – III

WEEK 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1D Arrays: searching
Lab 7: 1D Array manipulation, linear search

i) Find the min and max of a 1-D integer array
ii) Perform linear search on1D array
iii) The reverse of a 1D integer array
iv) Find 2's complement of the given binary number
v) Eliminate duplicate elements in an array

WEEK 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2D arrays, Sorting and Strings
Lab 8: Matrix problems, String operations, Bubble sort

i) Addition of two matrices
ii) Multiplication two matrices
iii) Sort array elements using bubble sort
iv) Concatenate two strings without built-in functions
v) Reverse a string using built-in and without built-in string functions

UNIT-IV

WEEK 9:

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 9: Functions, call by value, scope and extent,
Lab 9: Simple functions using call by value, Solving differential equations using Eulers theorem

i) Write a C function to calculate NCR value
ii) Write a C function to find the length of a string
iii) Write a C function to transpose of a matrix
iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 10:

Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 10: Recursion, the structure of recursive calls

Lab 10: Recursive functions

i) Write a recursive function to generate Fibonacci series
ii) Write a recursive function to find the lcm of two numbers
iii) Write a recursive function to find the factorial of a number
iv) Write a C Program to implement Ackermann function using recursion
v) Write a recursive function to find the sum of series.

WEEK 11:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 11: Call by reference, dangling pointers
Lab 11: Simple functions using Call by reference, Dangling pointers

i) Write a C program to swap two numbers using call by reference
ii) Demonstrate Dangling pointer problem using a C program
iii) Write a C program to copy one string into another using pointer
iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

UNIT – V

WEEK 12:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc(), calloc(), realloc() and free() functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 12: Pointers, structures and dynamic memory allocation
Lab 12: Pointers and structures, memory dereference

i) Write a C program to find the sum of a 1D array using malloc()
ii) Write a C program to find the total, average of n students using structures
iii) Enter n students data using calloc() and display failed students list
iv) Read student name and marks from the command line and display the student details along with the total.
v) Write a C program to implement realloc()

WEEK 13:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly-linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 12: Bitfields**,** Self-Referential Structures, Linked lists
Lab 12: Bitfields, linked lists

i) Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit-fields
ii) Create and display a singly linked list using self-referential structure
iii) Demonstrate the differences between structures and unions using a C program
iv) Write a C program to shift/rotate using bitfields
v) Write a C program to copy one structure variable to another structure of the same type.

WEEK 14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling:
Lab 14: File operations

i) Write a C program to write and read text into a file
ii) Write a C program to write and read text into a binary file using fread() and fwrite()
iii) Copy the contents of one file to another file
iv) Write a C program to merge two files into the third file using command-line arguments
v) Find no. of lines, words and characters in a file
vi) Write a C program to print last n characters of a given file.

TEXTBOOKS:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

REFERENCES:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India
2. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

COURSE OUTCOMES

CO1.	**Demonstrate** the ability to write a formal algorithmic solution for the given problem, **name & explain** the features of C like types including scalar & vector types, operators, expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.
CO2.	**Implement** one and two-dimensional arrays to solve simple mathematical and matrix related problems. **Make use of** loops and arrays for searching and **Compare** various sorting techniques.
CO3.	**Identify** the purpose of functions, pointers, command line arguments, dynamic memory allocation. **Define** storage classes. **Understand** command like arguments, structures and unions. Have **knowledge** of handling files.
CO4.	**Design** algorithms and **develop** programs in C language using the basic constructs, data types, operators, control statements, and arrays.
CO5	**Apply** pointers, functions, derived data types, and dynamic memory allocation, **design** solutions to challenging problems.
CO6	**Illustrate** the art of procedural programming in C and **develop** programs optimally using the full feature set of C language.

Course Title:	Programming for problem solving lab														
Course Code:	A2CII201														
Course Designed by	Dept. of CSE & IT														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2	3	1	1	1	2	2			2	2	2
CO2	3	3	1	2	3	1	1	1	2	2			2	2	2
CO3	3	3	2	3	3	2	1	1	2	2			3	3	3
CO4	3	3	2	3	3	3	1	1	2	2			3	3	3
CO5	3	3	3	3	3	3	1	1	2	2			3	3	3
CO6	3	3	3	3	3	3	1	1	3	3	3		3	3	3

Levels of Correlation: High-3, Medium-2, Low-1

Course designed by	DEPARTMENTS OF CSE & IT
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019

A2EHL001	SEMESTER - II	L	T	P	C
	Essential Communication in English	1	-	3	3
	Total Contact Hours – 60				

SYLLABUS

UNIT – I: BASIC LANGUAGE SKILLS – A REFRESHER

Organs of Speech: Consonant Sounds &Vowel Sounds; Phonemic Transcription; Using a Dictionary to know the Pronunciation of a word

Presenting Oneself: Introducing oneself -Using different expressions in Formal&Informal Contexts.

Reading a News Article: Identifying the key words and their usage; summarizing the information

Word Study & Mind Mapping: Root words–Derivatives; Homonyms, Homographs, Homophones; Synonyms & Antonyms

UNIT – II: RUDIMENTS OF FUNDAMENTAL COMMUNICATION

The World: Listening & watching Documentaries on World famous Places.

Describing People, Places and Life experiences: Physical Description- Describing someone's qualities – Usage of Jargon to present topography.

Short Story Corner: Reading a short story – Understanding the mood and essence – Sharing different perspectives.

Sentence Patterns: Concord – Rules – Common errors in day-day usage

UNIT-III: COMMUNICATION AT PRACTICE

Oratory Skills: Listening to World's Famous Speeches

JAM (Just a Minute) Talk: Format & Delivery Techniques

Nuances of Language: Company Description –Position Description (Formal) – processes like Chocolate Making(Informal)**.**

Types of Sentences – Declarative, Interrogative, Assertive etc.

UNIT-IV: COMMUNICATION THROUGH CONCEPTUAL LEARNING

BBC English: Watching interviews of Famous people.

Dialogue Practice: Situational Dialogues; Structuring a Role Play

New Inventions: Reading about latest technology pertaining to different fields (Source : Science Journals)

Transformation of sentences: Active Voice-Passive Voice**,** Direct & Indirect Speech**,** Degrees of Comparison**,** Simple Compound & Complex Sentences.

UNIT – V: COMMUNICATION THROUGH LIFE SKILLS

Watching Movies for Language Enrichment & Writing Reviews.

Skits: Enacting a Skit on a Social Issue

Reflections: Reading News Paper Editorial columns, Literacy Reviews, Poetry

Presenting an autobiography: Exploring different styles of writing autobiographies and evolving an own style**.**

TEXT BOOK:
Reference Source Compilation by the Department

REFERENCES:
1. **Fundamentals of Technical Communication** by Meenakshi Raman,OUP.
2. **Living English Structure** by W.Stannard Allen, Pearson Publications.
3. **English Made Easy** by Mary Margaret Hosler, Mc Graw Hill.
4.. **English and Communication Skills for Students of Science and Engineering**, by Dhanavel, S.P. Orient Blackswan Ltd.
5. **The Oxford Guide to Writing and Speaking** by John Seely , OUP

COURSE OUTCOMES:

CO1. Student will be able to come to terms with the basic language Skills required to cater to the requirement of the programme undertaken.

CO2. Student will be able to comprehend and analyze the core concepts well.

CO3. Student will be able to gain proficiency in all four skills of Language – Listening, Reading, Speaking and Writing.

CO4. Student will be able to understand the Syntactical and Grammatical Components of English Language and their correct use.

CO5: Student will be able to present his/her ideas confidently in a Professional manner.

CO/PO Mapping

Course Title:				**Essential Communication in English**										
Course Code:				A2EHL001										
Course Designed by				Dept. of English & Humanities										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2		2	3	3		3		
CO2						2		2	3	3		3		
CO3						2		2	3	3		3		
CO4						2		2	3	3		3		
CO5						2		2	3	3		3		

Course designed by	DEPARTMENT OF ENGLISH & HUMANITIES
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2MED201	SEMESTER - II	L	T	P	C
	COMPUTER AIDED ENGINEERING GRAPHICS	1	-	3	3
	Total Contact Hours – 60				

SYLLABUS

UNIT-I

Overview of Computer Graphics:

Computer technologies that impact on graphical communication, Demonstrating knowledge of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line, The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.

Set up of the drawing page and the printer, Scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing.

Applying dimensions to objects, applying annotations to drawings;

UNIT-II

Layers: Setting up and use of Layers, layers to create drawings, create, edit and use customized layers, concept of view ports.

Introduction to Orthographic Projections: Projections of Points; Projections of Straight Lines parallel to both planes; Projections of Straight Lines-Parallel to one and inclined to other plane.

UNIT-III

Projections of Straight Lines and Planes: Lines inclined to both planes, determination of true lengths, angle of inclinations and traces, Projections of Planes

UNIT-IV

Projections and sections of solids: Projections of simple solids- Sections of solids

UNIT -V

Development of surfaces, Isometric Projection and Conversion of Isometric Views to Orthographic Views: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa

TEXT BOOKS

1. DM Kulkarni, AP Rastogi, AK Sarkar "Engineering graphics with Auto CAD" PHI Publishers
2. Bhatt N.D., Panchal V.M. & Ingle P.R "Engineering Drawing" Charotar Publishing House.

REFERENCE BOOKS

1. Shah, M.B. & Rana B.C "Engineering Drawing and Computer Graphics", Pearson Education.
2. Agrawal B. & Agrawal C. M "Engineering Graphics", TMH Publication.
3. Narayana, K.L. & P Kannaiah "Engineering Drawing", SciTech Publishers.
4. CAD Software Theory and User Manuals.

COURSE OUTCOMES

At the end of the course the students will be able to:

CO1: Prepare two dimensional drawings using draw and modify commands in Auto CAD software and represent dimensions to the drawings

CO2: Clearly differentiate different types of projections and get solutions to projections of points in Auto CAD by applying the layers concept

CO3: Solve problems related to projections of straight lines and planes

CO4: Prepare simple solids in CAD software and obtain solutions to projections and sections of solids

CO5: Develop the surfaces of simple solids, prepare Isometric drawings and convert isometric drawings into orthographic views

CO/PO Mapping

Course Title:	Computer Aided Engineering Graphics													
Course Code:	A2MED201													
Course Designed by	Dept. of Mechanical Engineering													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2		3	1		1	2	3	2	2	3	2
CO2	3	2	2		3	1		1	2	3			2	1
CO3	3	2	2		3	1		1	2	3			2	1
CO4	3	2	3		3	1		1	2	3	2	2	3	1
CO5	3	2	3		3	1		1	2	3	2	2	3	1

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

* * *

B.Tech(Mechanical)

MAHARAJ VIJAYARAM GAPATHI RAJ COLLEGE OF ENGINEERING(AUTONOMOUS)
Vijayaram Nagar Campus, Chintalavalasa, Vizianagaram-535005, Andhra Pradesh
Accredited by NAAC with 'A' Grade & Listed u/s 2(f) & 12(B) of UGC
(Approved by AICTE, New Delhi and Permanently Affiliated by JNTUK-Kakinada)
NBA Accredited UG Courses: B.Tech(MEC), B.Tech(CIV), B.Tech(EEE), B.Tech(ECE), B.Tech(CSE), B.Tech(IT), B.Tech(MEC) & B.Tech(CHE) and PG Course: MBA

ACADEMIC REGULATIONS & CURRICULUM

Applicable to the students admitted from the Academic Year 2019-2020

MECHANICAL ENGINEERING

(B.Tech. Programme)

MAHARAJ VIJAYARAM GAJAPATHI RAJ COLLEGE OF ENGINEERING

(Autonomous)

(Approved by AICTE, New Delhi, and permanently affiliated to JNTUK, Kakinada)

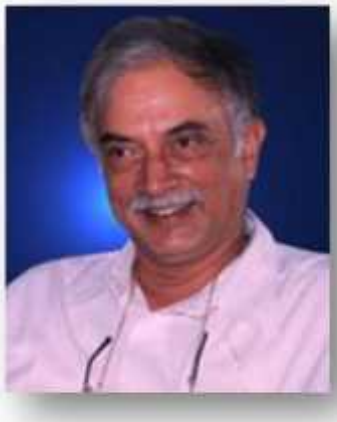
Listed u/s 2(f) & 12(B) of UGC Act 1956.

Vijayaram Nagar Campus, Chintalavalasa,Vizianagaram-535005, Andhra Pradesh

The visionaries

Late Dr. P V G Raju
Raja Saheb of Vizianagaram
Founder Chairman-MANSAS
Ex-Minister for Education and Health, Govt. of AP
Ex Member of Parliament

Late Dr. P. Anand Gajapathi Raju
Ex-Chairman-MANSAS
Ex-Minister for Education and Health
Govt. of AP
Ex Member of Parliament



P. Ashok Gajapathi Raju
Chairman-MANSAS
Ex-Union Minister for Civil Aviation,
Govt. of India
Ex-Minister for Finance, Govt. of AP

Vision

Maharaj Vijayaram Gajapathi Raj College of Engineering strives to become a centre par excellence for technical education where aspiring students can be transformed into skilled and well-rounded professionals with strong understanding of fundamentals, a flair for responsible innovation in engineering practical solutions applying the fundamentals, and confidence and poise to meet the challenges in their chosen professional spheres.

Mission

The management believes imparting quality education in an atmosphere that motivates learning as a social obligation which we owe to the students, their parents/guardians and society at large and hence the effort is to leave no stone unturned in providing the same with all sincerity. Towards that end, the management believes special focus has to be on the following areas:

M1: Have on-board staff with high quality experience and continuously updating themselves with latest research developments and sharing that knowledge with students.

M2: Having a well stream-lined teaching learning process that is continuously assessed for effectiveness and fine-tuned for improvement.

M3: Having state-of-the-art lab and general infrastructure that gives students the necessary tools and means to enhance their knowledge and understanding.

M4: Having a centralized department focused on improving placement opportunities for our students directly on campus and coordinating the training programs for students to complement the curriculum and enhance their career opportunities.

M5: Having advanced research facilities and more importantly atmosphere to encourage students to pursue self-learning on advanced topics and conduct research.

ABOUT THE INSTITUTION:

Maharajah Alak Narayan Society of Arts and Science (MANSAS) is an Educational Trust founded by Dr. (late) P.V.G Raju, Raja Saheb of Vizianagaram in the hallowed memory of his father Maharajah Alak Narayan Gajapati with a view to confound socio-economic inequalities in the Vizianagaram principality executing a trust deed on 12-11-1958 duly established Maharajah's College and other educational institutions in and around Vizianagaram. The Trust is a charitable one published under Section 6 a (1) of A.P Charitable and Hindu Religious Institutions and Endowment Act 30 of 1987.

The object of the Trust is to manage the properties of educational institutions under it and to promote and advance the cause of education in general, besides awarding scholarships to deserving students enabling them to undergo special training in science and industries in and out of India. The Trust has made an uncompromising contribution to the nation by presenting the stalwarts.

Trust offers KG to PhD level education in Arts, Sciences, Law, Pharmacy, Humanities Education, Engineering and Management and presently houses 13 Educational Institutions. MVGR College of Engineering is one of the 13 Institutes.

Other Institutions under MANSAS

1. M.R. HIGH SCHOOL 1857
2. M.R COLLEGE **(NAAC ACCREDITED)** 1879
3. M.R. COLLEGE OF EDUCATION 1950
4. M.R. WOMENS COLLEGE **(NAAC ACCREDITED)** 1962
5. M.R. GIRLS HIGH SCHOOL 1974
6. M.R. MODEL HIGH SCHOOL 1974
7. M.R. ENGLISH MEDIUM SCHOOL 1979
8. M.R.V.R.G.R LAW COLLEGE 1987
9. M.R. P.G. COLLEGE **(NAAC ACCREDITED)** 1987
10. M.R.SCHOOL OF MANAGEMENT STUDIES 1994
11. M.R.V.R.G.R – II MEMORIAL JR. COLLEGE 1994
12. M.R. COLLEGE OF PHARMACY 2004

Maharaj Vijayaram Gajapathi Raj (MVGR) College of Engineering was established in the year 1997 by Maharaj Alak Narayan Society for Arts and Sciences (MANSAS) to impart quality technical education. The Institution is located in lush green, serene and pollution free environment spread over 60 acres of land in Chintalavalasa village situated in the outskirts of Vizianagaram, a fort city in the north coastal region of Andhra Pradesh.

Institution at a glance:

- MVGR is a 22 years old institution, established in 1997
- All eligible UG Programs (CHEMICAL, CIV, CSE, ECE, EEE, IT & MECHANICAL) were reaccredited by NBA.
- MBA program was also re-accredited by NBA.
- Had been re-accredited with Grade 'A' by NAAC of UGC
- Has Permanent affiliation with JN Technological University-Kakinada
- Listed under sections 2(f) & 12(b) of UGC act 1956.
- Approved by AICTE-New Delhi
- EIGHT departments are recognized as RESEARCH CENTERS by JNTU-K
- Granted Autonomy by UGC in 2015
- Campus of 60 acre
- Offering 7 UG and 5 M.Tech., and 1 MBA program
- About 250 faculty of which 84 Ph.D. Degree holders
- 83 Laboratories with an investment of about 13 Crores
- Total built up area of about 7 Lakh Sft
- About 42,000 volumes and Access to 8 international online journal packages like IEEE, SPRINGER, etc.
- 1420 Systems & 395 Mbps band width internet facility
- About Rs. 4 Crore worth of on-going R&D projects
- Actively involved in civil engineering consultancy work as Third Party Quality Auditor for Vizianagaram Municipality
- WIPRO Recognized technology learning center and MISSION 10X partner institution
- Recognized National Instruments Academy for Training in LabView
- SIRO Recognition by DSIR
- Recognized PTC Centre of Excellence for Creo Training
- Identified by MSME as Business Incubation Centre
- APSSDC-Siemens Technical Skill Development Institute
- Recognized CMs SKILL EXCELLENCY CENTER (SEC)
- Microsoft Ed-vantage Platinum Partner
- Institutional member of IUCEE
- Institutional Member of CII
- Member, Chamber of Commerce, Vizianagaram
- Green Campus award by Govt. of AP

MVGR College of Engineering is rated as one among the best engineering colleges in the state of Andhra Pradesh as it set up highest standards in all areas of curricular, co-curricular and extra-curricular activities and in students' placements. Based on industry and expert's feedback, the college is updating the curriculum from time to time. The college offers many value added add-on courses students and conducts training programs to meet the industries' requirements.

Academic Regulations for B.Tech., Program

Applicable to the students admitted from the Academic year 2019-2020 onwards.

1. PROGRAM STRUCTURE:

B.Tech.:

Sl. No	Category	Credits
1	Humanities and Social Sciences including Management courses	12
2	Basic Science courses	25
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	26
4	Professional core courses	54
5	Professional Elective courses relevant to chosen specialization/branch	18
6	Open subjects – Electives from other technical and /or emerging subjects	12
7	Project work, seminar and internship in industry or elsewhere	13
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	0
	Total	160

- Open electives offered by the parent department are listed in the course structure and are offered to students of other programs. The students of parent departments may also opt the course, provided it shall not be listed in the curriculum.
- For audit course a student is deemed to satisfy the minimum contact hours, as prescribed by the department and shall also comply with the requirements for submission of assignments/projects. A student shall also opt for MOOCs and submit the certificate.

1. HSS Courses		
Sl. No.	Subject	Credits
1	English -1	3
2	English -2 (Technical English)	3
3	Elective-1 (Management Related course (MEFA or MS or Operations Research)	3
4	Elective-2 (Professional Ethics and Human Values)	3
	Total	**12**

2. Basic Science Courses		
Sl. No.	Subject	Credits
1	Mathematics-I	3
2	Mathematics-II	3
3	Mathematics-III	3
4	Mathematics-IV	3
5	Applied / Engineering Physics (Theory + Lab)	5
6	Engineering Chemistry (Theory + Lab)	5
7	Biology for Engineers	3
	Total	**25**

3. Engineering Science Courses		
Sl. No.	Subject	Credits
1	Programming for Problem Solving (Theory + Lab)	5
2	Internet of Things (IOT)	3
3	Computer aided Engineering Graphics	3
4	Basic Electrical Engineering (Theory + Lab)	5
5	Department wise Engineering Science Course-I (AI Tools , Techniques & Applications)	5
6	Department wise Engineering Science Course-II (Design thinking and Product Innovation)	3
7	Workshop (Department Specific)	**2**
	Total	**26**

	Subjects	Credits
4	**Professional Core Courses**	54
5	**Professional Elective Courses Relevant to Chosen Specialization/Branch**	18
6	**Open Subjects – Electives from other Technical and / or Emerging Subjects**	12
		84

7. Project		
Sl. No.	Subject	Credits
1	Socially Relevant Project	1
2	Mini Project	2
3	Project Phase - I	2
4	Project Phase - II	8
	Total	**13**

8. Audit Courses (Non Credit Course)		
Sl. No.	Subject	
1	Induction Program	
2	Constitution of India	
3	Indian Traditional Knowledge	
4	Environmental Science	

BOS Chairman shall notify the list of MOOCs offered (Open Elective & Professional Elective) in the beginning of the semester.

2. PROGRAM PATTERN:

B.Tech.: The program is for 4 academic years / 8 semesters.

B.Tech. (Lateral Entry): The program is for 3 academic years / 6 semesters.

3. AWARD OF DEGREE:

B.TECH:

A student will be declared eligible for the award of degree if he/she fulfills the following academic regulations.

a) A student shall be declared eligible for the award of degree, if he/she pursues a course of study for not less than four academic years and not more than eight academic years from the date of admission.

b) The student shall register for **160** credits and secure all **160** credits.

c) A student shall also register and successfully complete audit programs (Non-credit) as recommended by Academic Council.

d) A student on completing 1st year class work may opt for a break of 1 year which shall be deemed as GAP year, as recommended by APSCHE, for undertaking successful entrepreneurial ventures.

e) Students who fail to complete Four Years Course of study within 8 years shall forfeit their seat and their admission shall stand cancelled.

B.TECH (Lateral Entry):

A student will be declared eligible for the award of degree on fulfilling the following academic requirements.

a) A student shall be declared eligible for the award of the degree, if he/she pursues a course of study for not less than three academic years and not more than six academic years.

b) The student shall register for **126** credits and secure all **126** credits.

c) A student shall also register and successfully complete audit programs (Non-credit) as recommended by Academic Council.

d) Students who fail to complete their three Years Course of study within 6 years shall forfeit their seat and their admission shall stand cancelled.

e) Student shall register for bridge programs, if any, as administered by the respective departments at the beginning of 2nd year and successfully complete as per the guidelines of the Institution.

4. CERTIFICATION PROGRAMS:

Sl. No.	Dept.	Name of the Program
1	MECH	Windchill 10.2 PDM by Adroitec Engineering Solutions Pvt. Ltd., Hyderabad
2	MECH	Creo 2.0 by PTC
3	MECH	Edgecam by Verosoft, UK
4	MECH	ANSYS Training and Certification by Mechanical Department
5	MECH	AUTOCAD Training and Certification by Mechanical Department
6	MECH	Catia by APSSDC-Dassault Systems, CM's Center of Excellence
7	MECH	Delmia by APSSDC-Dassault Systems, CM's Center of Excellence
8	MECH	Simulia by APSSDC-Dassault Systems, CM's Center of Excellence
9	MECH	2-Wheeler Automobile Certification by APSSDC-SIEMENS
10	MECH	4-Wheeler Automobile Certification by APSSDC-SIEMENS
11	MECH	Welding Certification by APSSDC-SIEMENS
12	MECH	CNC Certification by APSSDC-SIEMENS
13	MECH	Commercial Electrical Certification by APSSDC-SIEMENS
14	MECH	Solid Edge Certification by APSSDC-SIEMENS
15	CHEM	Chemical Process Design and Simulation by Simtech Simulations, Hyderabad
16	ECE	Embedded Systems by Think LABS, Mumbai
17	ECE	Labview by National Instruments Systems India Pvt. Ltd.
18	ECE	Unified Technology Learning Program (UTLP) by Wipro Mission 10X
19	CSE, IT	PEGA by Virtusa Corporation
20	CSE, IT	Microsoft technologies by Microsoft Corp.
21	CSE, IT	Ethical Hacking by EC-Council Academia
22	CSE, IT	Java and C by Talent Sprint
23	CSE, IT	Network Analyst (CCNA) by Cisco Systems Inc
24	CSE, IT	Java Programming (OCJP) and DBMS by Oracle
25	EEE	PLC, Drives and Automation by Siemens
26	EEE	PLC by New Dawn Automation
27	EEE	Home Electrical Certification by APSSDC-SIEMENS
28	Civil	Remote Sensing and GIS by Indian Institute of Remote Sensing

a) The Institution shall offer the certification programs by itself or in collaboration with industry/such other Institutions deemed to have specialized expertise in the proposed area of training.
b) Only students of the Institution shall be eligible to register on payment of prescribed fee.
c) However, subject to availability of resources and the demand the Institution may offer the program to external candidates meeting the pre-qualification requirements and in the order of the merit.
d) The duration of the course and design of the content shall be done by the respective departments of the Institution by themselves or in collaboration with industry/such other institutions deemed to have specialized expertise in the proposed area of training.
e) If the duration of the course is less than or equal to 40 hours, it can be completed in one semester, otherwise, it can suitably distributed over a number of semesters.
f) Mere enrolment/registration for the program shall not entitle any claim for award of certificate.
g) A candidate shall be deemed eligible for the award of the certificate if he/she
   - Attends at least 75% of scheduled training sessions
   - Complies to all the requirements of submission of the assignments, presentations, seminars, projects, etc., and also appears for periodic tests.
   - Shall attain minimum levels of performance in tests as prescribed.
   - Shall remit such fee as deemed fit for the certification
   - A candidate registered and failed to meet the requirements shall be permitted to repeat the said training one another time after remitting 25% of the fee fixed for the program as re-registration fee.

If the student is absent for the periodic tests, the test shall be re-conducted on payment of 10% of fee.

5. COURSES OFFERED:

Name of the Program	Degree
UG Programs (Engineering & Technology)	B.Tech. (Civil) B.Tech. (EEE) B.Tech. (Mech.) B.Tech. (ECE) B.Tech. (CSE) B.Tech. (CHEM) B.Tech. (IT)
PG Programs (Engineering & Technology)	M.Tech. (Structural Engineering) M.Tech. (Power Systems) M.Tech. (PDM) M.Tech. (VLSI) M.Tech. (CN&IS)
Other PG Programs	MBA
Research Programs	Ph.D. in Civil, EEE, MECH, ECE, CSE, CHEM, MBA and MATHS

6. DISTRIBUTION AND WEIGHTAGE OF MARKS:

B.Tech.:

a). All Theory courses will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment:

Subjective tests	- 20 Marks
Objective tests	- 10 Marks
Assignments	- 10 Marks

- Two subjective tests shall be conducted.
- Each subjective test shall be conducted for 90 Minutes and have 3 questions each for 7 marks (No choice) and the same shall be scaled down to 20 Marks.
- Average of two subjective tests shall be considered.
- Two objective tests (online) shall be conducted each for 20 marks.
- Each objective test shall be conducted for 20 minutes and have 20 Multiple Choice Questions each for 1 mark and the same shall be scaled down to 10 Marks.
- Average of two objective tests shall be considered.
- Assignments shall be assessed for 10 marks.

External Assessment:

- External examination is for 60 marks (180 min). Question paper contains 10 questions (2 questions from each unit) and each question carries 12 marks. Student shall answer 5 questions (1 question from each unit).

b). **Laboratory/Practice:**

All Laboratory/Practice courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

- Continuous assessment for 15 marks for each experimental session finally averaged to 15 marks.
- Project based learning shall be assessed for 15 Marks.
- In Project based learning, a student has to identify a problem such that at least 3 or 4 modular learning of experiments shall be integrated and submit comprehensive report with solution at the end of the semester.
- An internal assessment test conducted at the end of the semester shall be assessed for 10 marks.

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Both internal and external examination shall include assessment of the student on
    a) Knowledge of principles/concepts involved
    b) Experimental design
    c) Result interpretation and analysis
    d) Experimental report

c). **Drawing/Design/Estimation:**

i) Computer Aided Engineering Graphics:

Evaluation Procedure:

The course will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Question paper contains 3 questions (with internal choice). **E**ach question carries 20 marks (5 marks for free hand drawing and list of commands & 15 marks for final drawing prepared in AUTOCAD). A Student shall answer all questions.

ii) Modeling and Assembly of Mechanical Elements:

Evaluation Procedure:

The course will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Semester End Examination shall include assessment of the student on Final drawings like modeling, assembly and drafting.
- Student is expected to execute one exercise.
- Final drawings like modeling, assembly and drafting hard copies shall be evaluated by both internal and external examiners

Integrated Course (Theory + Lab):

Theory and Lab shall be assessed for 200 Marks (Each 100 marks)

- For Integrated course, the theory shall be assessed for 100 marks, of which 40 marks for internal assessment and 60 marks for semester end external examination.
- The Lab shall be assessed for 100 marks , of which, 40 marks for internal assessment and 60 marks for semester end external examination

Socially Relevant Project:

- A student shall identify and provide a solution to the problem relevant to society/Profession/Industry.
- A student shall engage at least 15 hours on socially relevant project. Socially relevant project shall be evaluated internally for 50 marks by Project Review Committee (PRC). PRC comprising of HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide shall review the progress.

Mini Project:

- A student shall undergo internship for a period of 4 weeks/provide solution to the problem relevant to Industry/ Modern tool during the vacation after VI semester and submit comprehensive report.
  - Mini project shall be evaluated internally for 50 marks by Project Review Committee (PRC).
  - PRC shall prepare rubrics for assessment.

Project Evaluation:

Project is divided into 2 phases – Phase I & Phase II

- Evaluation shall comprise of internal and external assessment.
  Internal: 110 (Phase I 50 marks, Phase II 60 Marks)
  External: 90
- A project Review committee (PRC) comprising of HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide shall review the progress once in four weeks.

Project Phase I:

- Project Phase I shall be evaluated internally by PRC for 50 Marks.
- A student shall undertake project phase I during the VII semester.
- A student shall report to the guide/external supervisor and work under his supervision at least 2 hours per week.
- Assessment shall be on
  - Literature review
  - Identification and statement of the Problem

Project Phase II:

- A student shall undertake project phase II during the VIII semester.
- A student shall report to the guide/external supervisor and work under his supervision at least 8 hours per week.
- Internal evaluation shall be done by HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide for 60 marks.
- External evaluation shall be done by HoD, Guide/Internal Examiner and External Examiner for 90 marks.
- Assessment shall be on
  a) Review on fundamental knowledge involved
  b) Inter disciplinary aspect
  c) Experimental/methodology design
  d) Result analysis and interpretations
  e) Report writing
  f) Team work
  g) Presentation
  h) Viva-voce

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2^{nd}, 3^{rd} and 4^{th} years of study shall be same as applicable to regular B.Tech students.

7. ATTENDANCE REGULATIONS:

B.Tech.:

I. A student shall be eligible to appear for end semester examinations, if he or she acquires a minimum of 75% of attendance in aggregate of all the subjects (Theory & Lab.) for the semester.
II. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the college academic committee.
III. Shortage of attendance below 65% in aggregate of all the subjects (Theory & Lab) for the semester shall not be Condoned.
IV. Detained student shall seek re- admission for that semester when offered within 4 weeks from the date of commencement of class work.

PROMOTION RULE (Based on attendance):

- A Student shall be promoted to the next semester on fulfillment of minimum attendance requirement (75%) of current semester.

PROMOTION RULE (Based on credits):

- A student shall be promoted from IV semester to V semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to IV semester from the following examinations irrespective of whether the candidate takes the examination or not.
    - Two regular and Two supplementary examinations of I semester
    - Two regular and One supplementary examinations of II semester
    - One regular examination and One supplementary examination of III semester
    - One regular examination of IV semester.

- A student shall be promoted from VI semester to VII semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to IV semester from the following examinations irrespective of whether the candidate takes the examination or not.
    - Three regular and Three supplementary examinations of I semester
    - Three regular and Two supplementary examinations of II semester
    - Two regular and Two supplementary examinations of III semester
    - Two regular and One supplementary examinations of IV semester
    - One regular and One supplementary examination of V semester
    - One regular examination of VI semester.

B.TECH (Lateral Entry):

PROMOTION RULE (Based on attendance):

A Student shall be promoted to the next semester on fulfillment of minimum attendance requirement of current semester.

PROMOTION RULE (Based on credits):

A student shall be promoted from VI semester to VII semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to VI semester from the following examinations irrespective of whether the candidate takes the examination or not.

- Two regular and Two supplementary examinations of III semester
- Two regular and one supplementary examinations of IV semester
- One regular and One supplementary examinations of V semester
- One regular examination of VI semester.

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2nd, 3rd and 4th years of study shall be same as applicable to regular B.Tech students.

8. MINIMUM ACADEMIC REQUIREMENTS:

B.Tech.: (Theory/Lab)

i. A student is deemed to have satisfied the minimum academic requirements for a course on securing at least 24 marks out of 60 marks at semester end examination and overall minimum of 40 marks out of 100 marks including internal assessment.

ii. **Integrated Course (Theory + Lab):**

- The student shall secure minimum 24 marks out of 60 marks at semester end examination and overall 40 marks out of 100 marks for Theory and Laboratory courses independently. In case of failure in either theory or Laboratory course, the student should re-appear for both theory and laboratory.
- The assessment shall be done independently for both theory and laboratory courses and final marks shall be calculated on weighted average method for converting marks into grade points.

  Sample calculation:

  Integrated course-5 credits. Theory is for 3 credits and laboratory is for 2 credits.

  Total Marks obtained in theory: 70 out of 100 (3 Credits)

  Total Marks obtained in Lab : 90 out of 100 (2 Credits)

  Final marks of the integrated course is

  (70X3 + 90X2) / 5 = 78 Marks

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2nd, 3rd and 4th years of study shall be same as applicable to regular B.Tech students.

9. GRADING SYSTEM:

B.Tech. / B.Tech. (Lateral Entry)

Semester Grade Point Average (SGPA) for the current semester which is calculated on the basis of grade points obtained in all courses, except audit courses and courses in which satisfactory or course continuation has been awarded,

SGPA= Σ (course credits earned x Grade points) /
Σ (Total course credits in the semester.

CGPA= Σ (course credits earned x Grade points) up to successfully completed semesters / Σ (Total course credits up to successfully completed.

The UGC recommends a 10-point grading system with the following letter grades as

given below:

O	(Outstanding)	10
A+	(Excellent)	9
A	(Very Good)	8
B+	(Good)	7
B	(Above Average)	6
C	(Average)	5
P	(Pass)	4
F	(Fail)	0
Ab	(Absent)	0

- iii. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X10 = 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			**139**

Thus, **SGPA** =139/20 = 6.95

Illustration for CGPA

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
Credits: 16	Credits: 18	Credits: 25	Credits: 21	Credits: 23	Credits: 22
SGPA: 7.9	SGPA: 7.8	SGPA: 7.6	SGPA: 8.0	SGPA: 8.3	SGPA: 8.6

Semester 7	Semester 8
Credits: 21	Credits:14
SGPA: 8.2	SGPA: 8.5

Thus,

CGPA= $\frac{16x7.9 + 18x7.8 + 25x7.6 + 21x8.0 + 23x8.3 + 22x8.6 + 21x8.2 + 14x8.5}{160}$ = **8.1**

10. ELIGIBILITY FOR AWARD OF DEGREE:

B.Tech:

A student shall be eligible for award of the degree if he/she fulfills the following conditions:

1) Successfully completes all the courses prescribed for the Program.
2) CGPA greater than or equal to 4.5(Minimum requirement for Pass),

11. AWARD OF CLASS:

B.Tech:

Eligible Candidates for the award of B.Tech., Degree shall be placed in one of the following Classes based on CGPA.

Class	CGPA
Distinction	≥ 7.5
First Class	≥ 6.5
Second Class	≥ 5.5
Pass class	≥ 4.5

12. INSTRUCTION DAYS:

A semester shall have a minimum of 90 clear instruction days (including internal examinations).

13. Transfers from other Institutions shall not be permitted.

14. SUPPLEMENTARY EXAMINATIONS:

Supplementary examinations shall be conducted within 4 weeks from the date of announcement of results of regular examinations.

15. WITHHOLDING OF RESULTS: The result of a student shall be withheld

- If the student has not paid the dues, if any, to the institution
- If any case of pending disciplinary action ,
- Involvement in any sort of malpractices etc.
- Involvement in ragging.

16. TRANSITORY REGULATIONS:

A Candidate shall be readmitted from University regulations to A1 regulations or from A1 regulations to A2 regulations as per the guide lines of JNTUK.

17. AMENDMENTS TO REGULATIONS:

The Academic Council of MVGR College of Engineering (Autonomous) reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations, and/ or Syllabi or any other such matter relating to the requirements of the program which are compatible to the contemporary/emerging trends effectively meeting the needs of society/industry/stake holding groups.

18. Regulations for MALPRACTICES during the conduct of examinations

	Nature of Malpractices/Improper conduct	Punishment
1 (a)	If the candidate possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only. *
(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. *

2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled. *
3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider/candidate not on rolls, he will be handed over to the police and a case is registered against him. *
4	If the candidate mishandles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. Also if the answer script is mutilated / damaged disturbing the shape, of the script, answers, the bar code intentionally.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. He shall be debarred from class work and all examinations and be allowed to reregistered for the next subsequent odd or even semester only. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.*

5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	The same should be brought to the notice of CE who in turn in consultation with malpractice committee makes decision for cancellation of the performance in that subject. *
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. *
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. *
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. *

9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. *
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. *
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.*

*

19. General :

- Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
- The academic regulation should be read as a whole for the purpose of any interpretation.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

* * *

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

- Ragging within or outside any educational institution is prohibited.
- Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	 2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	 10 Months	+	Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE MVGR A RAGGING FREE CAMPUS

Ragging

ABSOLUTELY NO TO RAGGING

1. **Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.**
2. **Ragging entails heavy fines and/or imprisonment.**
3. **Ragging invokes suspension and dismissal from the College.**
4. **Outsiders are prohibited from entering the College and Hostel without permission.**
5. **Girl students must be in their hostel rooms by 7.00 p.m.**
6. **All the students must carry their Identity Cards and show them when demanded**
7. **The Principal and the Wardens may visit the Hostels and inspect the rooms any time.**

PROGRAM STRUCTURE
B.Tech. (MECHANICAL ENGINEERING)

SEMESTER - I						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2MAT101	Mathematics-I	3	-	-	3
2	A2CYI101	Engineering Chemistry (Theory + Lab)	3	-	3	5
3	A2EEI201	Basic Electrical Engineering (Theory + Lab)	3	-	3	5
4	A2MEW201	Work Shop	-	-	3	2
5	A2EHA701	Constitution of India	2	-	-	0
					Total Number of Credits	**15**

SEMESTER - II						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2MAT102	Mathematics-II	3	-	-	3
2	A2PYI101	Engineering Physics (Theory + Lab)	3	-	3	5
3	A2CII201	Programming for Problem Solving (Theory + Lab)	3	-	3	5
4	A2MED201	Computer Aided Engineering Graphics	1	-	4	3
5	A2EHL001	English-I	1	-	3	3
					Total Number of Credits	**19**

SEMESTER - III						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2MAT106	Mathematics-III	3	-	-	3
2	A2CYT201	Biology for Engineers	3	-	-	3
3	A2EHL002	English-II (Technical English)	2	-	2	3
4	A2EHT001	Professional Ethics and Human Values	3	-	-	3
5	A2MET301	Engineering Mechanics	3	-	-	3
6	A2MET302	Engineering Thermodynamics	3	-	-	3
7	A2MET303	Materials Engineering	3	-	-	3
8	A2MEL301	Modeling and Assembly of Mechanical Elements	-	-	4	2
9	A2CHA701	Environmental Science	2	-	-	0
					Total Number of Credits	**23**

SEMESTER - IV						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2MAT110	Mathematics-IV	3	-	-	3
2	A2MEI201	AI Tools, Techniques & Applications	3	-	3	5
3	A2MET202	Design Thinking and Product Innovation	3	-	-	3
4	A2MET304	Strength of Materials	3	-	-	3
5	A2MET305	Fluid Mechanics and Fluid Machines	3	-	-	3
6	A2MET306	Manufacturing Processes	3	-	-	3
7	A2MEL302	Materials Laboratory	-	-	3	2
8	A2MEP601	Socially Relevant Project	-	-	2	1
9	A2EHA702	Indian Traditional Knowledge	2	-	-	0
					Total Number of Credits	**23**

SEMESTER - V						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2MET307	Theory of Machines	3	-	-	3
2	A2MET308	Design of Machine Elements	3	-	-	3
3	A2MET309	Internal Combustion Engines	3	-	-	3
4	A2MET310	Manufacturing Technology	3	-	-	3
5	A2MET201	Internet of Things (IOT)	3	-	-	3
6	A2MET4XX	Professional Elective-I	3	-	-	3
7	A2XXT5XX	Open Elective-I	3	-	-	3
8	A2MEL303	Thermal Engineering Laboratory	-	-	3	2
					Total Number of Credits	**23**

Semester - VI						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2MET311	Computer Aided Design and Analysis	3	-	-	3
2	A2MET312	Applied Thermodynamics	3	-	-	3
3	A2MET313	Heat Transfer	3	-	-	3
4	A2MET001	Operations Research	3	-	-	3
5	A2MET4XX	Professional Elective-II	3	-	-	3
6	A2XXT5XX	Open Elective-II	3	-	-	3
7	A2MEL304	Simulation Laboratory	-	-	3	2
8	A2MEP602	Mini Project	-	-	4	2
					Total Number of Credits	**22**

Semester - VII						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2MET314	Mechanical Measurements and Instrumentation	3	-	-	3
2	A2MEI301	Manufacturing Systems (Theory + Lab)	3	-	2	4
3	A2MET4XX	Professional Elective-III	3	-	-	3
4	A2MET4XX	Professional Elective-IV	3	-	-	3
5	A2MET4XX	Professional Elective-V	3	-	-	3
6	A2MET4XX	Professional Elective-VI	3	-	-	3
7	A2MEP603	Project Phase - I	-	-	4	2
		Total Number of Credits				**21**

Semester - VIII						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2XXT5XX	Open Elective-III (MOOCS)	-	-	-	3
2	A2XXT5XX	Open Elective-IV (MOOCS)	-	-	-	3
3	A2MEP604	Project Phase - II	-	-	16	8
		Total Number of Credits				**14**

Professional Elective-I		
S.No	Course Code	Course Title
1	A2MET401	Advanced Strength of Materials
2	A2MET402	Surface Engineering
3	A2MET403	Automobile Engineering
4	A2MET404	Design and Analysis of Experiments

Professional Elective-II		
S.No	Course Code	Course Title
1	A2MET405	Design of Transmission Systems
2	A2MET406	Leadership
3	A2MET407	Air Craft and Jet Propulsion
4	A2MET408	Entrepreneurship

Professional Elective-III		
S.No	Course Code	Course Title
1	A2MET409	Finite Element Analysis
2	A2MET410	Composite Materials
3	A2MET411	Refrigeration and Air Conditioning
4	A2MET412	Industrial Engineering and Management

Professional Elective-IV		
S.No	Course Code	Course Title
1	A2MET413	Mechanical Vibrations & Condition Monitoring
2	A2MET414	Creep, Fatigue and Fracture Mechanics
3	A2MET415	Computational Fluid Dynamics
4	A2MET416	Automation in manufacturing

Professional Elective-V		
S.No	Course Code	Course Title
1	A2MET417	Mechatronic Systems
2	A2MET418	Non Destructive Testing
3	A2MET419	Power Plant Engineering
4	A2MET420	Six Sigma

Professional Elective-VI		
S.No	Course Code	Course Title
1	A2MET421	Product Lifecycle Management
2	A2MET422	Process Planning and Cost Estimation
3	A2MET423	Renewable energy resources
4	A2MET424	Total Quality Management

Open Electives offered by Mechanical Department		
S.No	Course Code	Course Title
1	A2MET501	Introduction to Robotics
2	A2MET502	Solar and Wind Energy
3	A2MET503	Production and Operations Management
4	A2MET504	Micro Electromechanical Systems
5	A2MET505	Product Design
6	A2MET506	Foundation of Computational Fluid Dynamics

A2MAT101	SEMESTER - I	L	T	P	C
	MATHEMATICS-I (common to ALL branches)	3	0	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: LINEAR ALGEBRA-1

Rank of a matrix: Elementary row and column transformations, equivalent matrices, Echelon form of a matrix, calculation of rank by reducing the matrix to Echelon form. System of equations: Linear system of equations, homogeneous and non-homogeneous system of equations, consistency criteria, trivial and non-trivial solutions, solving system of equations by Rank method; Eigenvalues and Eigenvectors: Finding Eigenvalues and Eigenvectors, properties of Eigenvalues and Eigenvectors (statements) including spectral mapping theorem.

UNIT- II: LINEAR ALGEBRA-2

Cayley-Hamilton Theorem: Statement of the theorem and its verification. Applications: Finding higher powers of a matrix, finding matrix polynomials, finding inverse of matrix. Diagonal form of a matrix: Reduction to diagonal form, spectral and modal matrices, finding higher powers of a matrix using diagonalisation, Quadratic forms: Matrix form of quadratic forms, orthogonal transformation, canonical form, reduction of quadratic form to canonical form by orthogonal transformation method, rank, index, signature and nature (definiteness) of a quadratic form.

UNIT-III: FIRST ORDER DIFFERENTIAL EQUATIONS & APPLICATIONS

Outlines: Differential Equations(DEs), Order and degree of a DE, Formation of DEs, general solutions of a DE; Solving first order and first degree DEs: linear DEs, Bernoulli's DEs (reducible to linear), exact DEs, integrating factors, non-exact DEs (reducible to exact).

Applications to real world problems: Newton's law of cooling, laws of growth and decay, family of curves, orthogonality of families curves, orthogonal trajectories (Cartesian and polar curves).

UNIT-IV: HIGHER ORDER DIFFERENTIAL EQUATIONS

Differential equations of higher order: Linear differential equations of higher order, its operator form. Solution concepts: General (complete) solution, particular solution. Solution of linear differential equations of higher order: Auxiliary equations, rules for finding complementary functions, rules for finding particular integrals (general and special methods).

UNIT-V: LAPLACE TRANSFORMS

Laplace transformation: Laplace transformation of elementary functions, Properties: Linearity, change of scale, first shifting properties, finding Laplace transformations using properties, Advanced properties: Laplace transformations of derivatives and integrals, multiplication by t^n, division by t (statements), finding Laplace transformations

using advanced properties; Inverse Laplace transformations: Finding inverse Laplace transformations using partial fractions, statement of Convolution theorem, finding inverse Laplace transformations by Convolution theorem; Applications: Solving Initial Value Problems by using Laplace transformations.

//Topics prefixed with 'outlines / overview' are not for assessment//

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017
2. T.K.V. Iyengar et al, Engineering Mathematics, S. Chand Publishers, Revised edition

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010
3. T. Veerarajan, Higher Engineering Mathematics, Tata McGraw-Hill, 2008

COURSE OUTCOMES: Learners at the end of this course will be able to

CO 1	KO#1	Recall the concepts of Linear algebra
CO 2	KO#2	Recall the solution methods and applicability of first order differential equations
CO 3	KO#3	Recall the solution methods of higher order differential equations and the concepts of Laplace transforms
CO 4	UO#1	Use and interpret the concepts of linear algebra
CO 5	UO#2	Use and interpret solution methods and applicability of first order differential equations
CO 6	UO#3	Use and interpret solution methods of higher order differential equations and the concepts of Laplace transforms
CO 7	AO#1	Apply the concepts of linear algebra, differential equations and Laplace transformation to model and solve real world problems

CO/PO Mapping

Course Title:	Mathematics-I (Common to ALL Branches)													
Course Code:	A2MAT101													
Course Designed by	Dept. of Mathematics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2							2			
CO2	3	3		2							2			
CO3	3	3		2							2			
CO4	3	3		2							2			
CO5	3	3		2							2			
CO6	3	3		2							2			
CO7	3	3		2							2			

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 06.07.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CYI101	SEMESTER - I	L	T	P	C
	ENGINEERING CHEMISTRY (Common to all branches)	3	--	2	5
	Total Contact Hours – 48				

SYLLABUS

UNIT 1: WATER TECHNOLOGY

Introduction –Soft Water and hardness of water, Estimation of hardness by EDTA Method - Boiler troubles - Industrial water treatment – specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, zeolite and ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.

UNIT 2: POLYMERS

Introduction to polymers, functionality of monomers, addition and condensation polymerization, copolymerization, stereospecific polymerization with specific examples. Thermoplastics and Thermo-sets – their differences.

Elastomers – applications with specific examples- Preparation, properties and uses of PVC, Bakelite, Teflon and Nylon-6, 6, Buna-S and Thiokol rubber- Fibre reinforced plastics – carbon fibre, glass fibre and aramids.

UNIT 3: ELECTROCHEMISTRY AND APPLICATIONS

Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations.
Primary cells –dry cell- Secondary cells – lead acid, nickel-cadmium and lithium ion batteries- working of the batteries including cell reactions- Fuel cells, hydrogen-oxygen, and methanol fuel cells – working of the cells.
Corrosion: Introduction to corrosion, mechanism of dry and wet corrosion, Pilling Bedworth ratios and uses, Types of corrosion – Differential aeration corrosion, galvanic corrosion, pitting corrosion, waterline corrosion and stress corrosion, Factors affecting the rate of corrosion – metal based factors and environmental based factors, protection techniques – metal coatings – galvanization and tinning, cathodic protection, inhibitors – cathodic and anodic, organic coatings – paints – constituents and their functions.

UNIT-4: CHEMISTRY OF ADVANCED MATERIALS

NANOMATERIALS: introduction- synthesis of Nano material by sol gel method- CVD- engineering applications of Nano materials

CEMENT: Introduction to ordinary Portland cement- manufacturing of OPC- setting and hardening of cement- decay of cement.

FUELS: Introduction- classification- liquid fuels- cracking- knocking- octane number and cetane number; Lubricants- definition- mechanism and properties of lubricants

UNIT 5: INSTRUMENTAL METHODS AND APPLICATIONS

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle, instrumentation (Block diagram and working), applications of UV, IR and NMR spectroscopic methods. Chromatography- introduction- Ion exchange chromatography- applications

COURSE OUTCOMES:

CO1: The student will have the ability to describe softening methods and desalination processes. He/ She will be able to explain various types of polymers; preparation, properties and engineering applications of thermoplastic, thermosetting plastics, rubbers and FRP's.

CO2: The student will have the ability to describe electrochemical reactions, principles of batteries, fuel cell and corrosion.

CO3: The student will have the ability to outline electromagnetic spectrum and explain the working principles of IR, UV, NMR and chromatographic techniques. The student describes the synthesis, properties and applications of nanomaterials, cement. HE/ She Outlines the cracking methods, knocking of fuels.

CO4: The student will have the ability to differentiate between hard and soft water, demineralization and deionization processes and thermosetting – thermoplastic materials.

CO5: The students will have the ability to give examples on primary and secondary batteries, various types of corrosion, methods of corrosion prevention.

CO6: The student will have the ability to draw inferences on the principles and applications of various instrumental methods and also can compare and contrast between cracking methods.

CO7: The student will have the ability to analyze water samples and validate the results obtained and apply their knowledge on polymers, batteries, materials and instrumentation.

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

Reference books:

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. H.Kaur, Instrumental Methods of chemical analysis, Pragathi Prakashan, 2012.
3. Chemistry for Engineers, Teh Fu Yen, Imperial college press, London

CO/PO Mapping

Course Title:	Engineering Chemistry													
Course Code:	A2CYI101													
Course Designed by	Dept. of Chemistry													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								2			1		
CO2	3								2			1		
CO3	3								2			1		
CO4	3								2			1		
CO5	3								2			1		
CO6	3								2			1		
CO7	3								2			1		

Course designed by	DEPARTMENT OF CHEMISTRY
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

Engineering Chemistry - Laboratory

List of Experiments:

1. Determination of HCl using sodium carbonate
2. Determination of Hardness of a groundwater sample.
3. pH metric titration of strong acid vs. strong base
4. Condcutometric titration of Strong acid VS Strong base
5. Condcutometric titration of Weak acid VS strong base
6. Potentiometric titration of Fe(II) with potassium dichromate
7. Determination of Strength of an acid in Pb-Acid battery
8. Preparation of a polymer
9. Determination of viscosity of polymer solution using survismeter
10. Determination of percentage of Iron in Cement sample by colorimetry
11. Estimation of Calcium oxide in port land Cement
12. Preparation of Nanomaterials (ex: Fe/ Zn/ Ferrite)
13. Adsorption of acetic acid by charcoal
14. Determination of acid value and saponification value of a given lubricant
15. Project based learning (Mandatory for all students)

Course Outcomes:

CO1: The student will be able to determine total hardness, strength of acid in a lead acid battery, calcium in Portland cement using volumetric analysis

CO2: The student will be able to explain condcutometric, potentiometric, pH metric titrations and colorimetric determination.

CO3: The student will be able to explain the synthesis of a polymer, nanomaterials

CO/PO Mapping

Course Title:	Engineering Chemistry													
Course Code:	A2CYI101													
Course Designed by	Dept. of Chemistry													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		1			1				1	1	2		
CO2	3		1			1				1	1	1		
CO3	3		1							1	1	1		

Course designed by	DEPARTMENT OF CHEMISTRY
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2EEI201	SEMESTER – I	L	T	P	C
	Basic Electrical Engineering (Common to all branches)	3	1	2	5
	Total Contact Hours – 50				

SYLLABUS

UNIT 1: D.C. CIRCUITS

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, Analysis of simple circuits with DC excitation, Superposition, Thevenin's and Norton's Theorems, Time-domain analysis of first-order RL and RC circuits.

UNIT 2: A.C. CIRCUITS

Representation of sinusoidal waveforms, Average and RMS values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase AC circuits (Series & Parallel), Resonance, Three-phase balanced circuits, voltage and current relations in star and delta configurations.

UNIT 3: DC & AC MACHINES [ELEMENTARY TREATMENT ONLY]

Principle and operation of DC Generator - EMF equation – open circuit characteristic of DC shunt generator – principle and operation of DC Motor – Types of DC Motors – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of single-phase Transformer - OC and SC tests on transformer - principle and operation of single phase & Three phase Induction Motors, construction and working of synchronous motors

UNIT 4: BASICS OF POWER SYSTEMS:

Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.

UNIT 5: ELECTRICAL INSTALLATIONS

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Types of Batteries, Characteristics of Batteries. Elementary calculations for energy consumption, power factor improvement, battery backup.

TEXT BOOK/ REFERENCES:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010
2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
3. Vincent Del Toro, "Electrical Engineering Fundamentals", Pearson, 2015.

COURSE OUTCOMES:

At the end of the course, Student will be able to

CO1. To recall fundamental concepts of electrical circuits such as charge, voltage, current and power.
CO2. Describe the principle of operation of D.C. & A.C. machines.
CO3. Outline the working operation of various generating stations.
CO4. Explain the procedure for solving circuits with A.C and D.C. Excitation
CO5. Summarize the performance characteristics of different machines.
CO6. Explain about different equipment used in power industry
CO7. Apply the fundamental laws, associated with Basic Electrical Engineering to solve real world problems in the field of Engineering

CO/PO Mapping

CO / PO mapping	Program Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
To recall fundamental concepts of electrical circuits such as charge, voltage, current and power.	3	3	1	1			3			1			1	1
Describe the principle of operation of D.C. & A.C. machines.	3	2	2	2	2					1			1	1
Outline the working operation of various generating stations.	3	3	3	1	1		1			1			1	1
Explain the procedure for solving circuits with A.C and D.C. Excitation	3	3	2	1	1		2			1			1	1
Summarize the performance characteristics of different machines.	3	3	2	1	1	3	1			1			1	1
Explain about different equipment used in power industry	3	3	2	1		2	2			1		1	3	2
Apply the fundamental laws, associated with Basic Electrical Engineering to solve real world problems in the field of Engineering	3	3	3	3	3	2	2			2		3	3	3

Course designed by	Department of Electrical & Electronics Engineering
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

Basic Electrical Engineering Laboratory

LIST OF EXPERIMENTS

Basic safety precautions, Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope, resistors, capacitors and inductors.

1. Verification of Kirchhoff laws.
2. Verification of Network Theorems.
3. Magnetization characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. Predetermination of performance parameters of 1 – Phase Transformer.
6. I – V Characteristics of Solar PV cell
7. Brake test on DC Shunt Motor.
8. Measurement of earth resistance.
9. Measurement of reactive power in three phase balanced circuit.
10. Measurement of Choke coil parameters
11. Brake test on 3 - Phase Induction Motor.
12. Determination of AC quantities using CRO/DSO.
13. I – V characteristics of battery.

COURSE OUTCOMES:

At the end of the course, Student will be able to

CO 1. Identify common electrical equipment used in laboratory.(L1)

CO 2. Estimate the ratings of different equipment used to perform an experiment. (L2)

CO 3. Demonstrate the usage of various electrical measuring instruments.(L3)

CO 4. Analyze the characteristics of rotating & stationery electrical machines (L4).

CO 5. Interpret the characteristics of PV cell and Battery.(L5)

CO/PO Mapping

CO / PO Mapping	Program Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
Identify common electrical equipment used in laboratory.	3		1	1	3	1			3	2	2	2	2	1
Estimate the ratings of different equipment used to perform an experiment.	3	2	3	3	3	2	1		3	3	2	2	2	3
Demonstrate the usage of various electrical measuring instruments.	2	2	2	2	3	1			3	3	1	2	2	1
Analyze the characteristics of rotating & stationery electrical machines.	3	3	3	3	2				3	3		2	3	2
Interpret the characteristics of PV cell and Battery.	3	3	3	3	3		1		3	3	2	2	3	3

Course designed by	Department of Electrical & Electronics Engineering
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2MEW201	SEMESTER - I	L	T	P	C
	WORKSHOP	-	-	3	2
	Total Contact Hours – 36				

LIST OF EXPERIMENTS

1. Assembly and Disassembly of Bicycle (Fitting)
2. Assembly and Disassembly of Two Wheeler Engine- using power tools (Fitting)
3. Load Estimation for house appliances, Different types of Electric wire specifications, Design of earth pit, Selection of wires and Switch gears.
4. Foundry practice: (Pattern design, Mold making and Casting demonstration)
5. Welding: (Arc welding, Transformer selection and connections, Different "G" position welding. Gas welding)
6. Machine Shop : Turning, Milling, Grinding

TEXT BOOKS:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.

REFERENCE BOOKS:

1. Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology – I" Pearson Education, 2008.
2. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
3. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.

COURSE OUTCOMES:

After completion of this course, the student will be able to

CO1. Identify and overhaul the components of Bicycle/ Two Wheeler Engine.
CO2. Identify the elements of casting, pattern making and prepare a mould for a single piece and split piece pattern.
CO3. Know the specifications, cutting parameter and perform drilling, milling and grinding operations.
CO4. Know the specifications, welding parameters and perform arc welding and gas welding.
CO5: Calculate load for required electrical design and select correct specifications of electrical requisites.

CO/PO Mapping

Course Title:	Workshop													
Course Code:	A2MEW201													
Course Designed by	Dept. of Mechanical Engineering													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3	1		1	3	2	2	2	3	2
CO2	3		2	1	1	1	1	1	3	2	2	2	3	3
CO3	3		2	1	1	1	1	1	3	2	2	2	3	3
CO4	3		2	1	1	1	1	1	3	2	2	2	3	3
CO5	3	2	2	1	1	3	1	3	3	3	2	2	3	3

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2EHA701	SEMESTER - I	L	T	P	C
	CONSTITUTION OF INDIA	2	-	-	0
	Total Contact Hours – 30				

SYLLABUS

UNIT – I: HISTORY OF MAKING OF THE INDIAN CONSTITUTION

History - Drafting Committee, (Composition & Working)

UNIT – II: PHILOSOPHY OF THE INDIAN CONSTITUTION: Preamble - Salient Features

UNIT-III: CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES: Fundamental Rights -Right to Equality -Right to Freedom -Right against Exploitation -Right to Freedom of Religion -Cultural and Educational Rights -Right to Constitutional Remedies ; Directive Principles of State Policy ; Fundamental Duties.

UNIT-IV: ORGANS OF GOVERNANCE: Parliament -Composition - Qualifications and Disqualifications - Powers and Functions - Executive - President - Governor - Council of Ministers; Judiciary, Appointment and Transfer of Judges, Qualifications.

UNIT – V: LOCAL ADMINISTRATION: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayati raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat : Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

TEXT BOOK:
Reference Source compilation

REFERENCES:
1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.

COURSE OUTCOMES:

CO1.	Students will be able to discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO2.	Students will be able discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
CO3.	Students will be able to discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP]under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
CO4.	Students will be able to discuss the passage of the Hindu Code Bill of 1956.
CO5.	Students will be able to discuss the powers of Executive, Judiciary and Legislature.

CO/PO Mapping

Course Title:	Constitution of India (Common to ALL Branches)
Course Code:	A2EHA701
Course Designed by	Dept. of English & Humanities

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2								
CO2						2								
CO3						2								
CO4						2								
CO5						2								

Course designed by	DEPARTMENT OF ENGLISH & HUMANITIES
Approval	Approved by: Meeting of Board of Studies held on 23.06.15
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

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A2MAT102	SEMESTER - II	L	T	P	C
	MATHEMATICS-II (MEC,ECE,EEE,CHE & CIV)	3	0	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: NUMERICAL METHODS-1

Solving Algebraic and Transcendental Equations: Intermediate value theorem (statement), solution concepts, error in solution, measure of accuracy, approximate and exact solutions, Solution methods: Bisection method, Regula-Falsi method and Newton-Raphson Iterative method; Finite differences: Forward, backward and shift operators, relations among operators, Interpolation: Interpolation and extrapolation, data of equal and unequal intervals, Newton's forward and backward Interpolation formulae, Lagrange's interpolation formula, Fitting polynomials to the data by using Newton's and Lagrange's formulae, Inverse Interpolation by Lagrange's formula.

UNIT- II: NUMERICAL METHODS-2

Numerical Integration: Simpson's and Trapezoidal rules, Weddle's and Boole's rules of integrations; Numerical solutions of ordinary differential equations: Concepts of Initial Value Problem, Taylor's series method, Euler's method, Runge - Kutta method of fourth order; Predictor-corrector method: Milne's method to solve initial value problems.

UNIT-III: MULTIVARIABLE CALCULUS

Overview: Functions of two variables, limit and continuity, partial derivative and its geometrical meaning; Functions of several variables: Partial differential coefficients of higher order, total derivatives, Chain rules for partial differentiation, partial differentiation of Implicit functions; Jacobians: Jacobian and properties, chain rule, functional dependence, Jacobian of implicit functions

Maxima and Minima: Maxima and minima of a function of two variables, constrained maxima and minima, Lagrange's method of undetermined multipliers.

UNIT-IV: PARTIAL DIFFERENTIAL EQUATIONS -FIRST ORDER

Formation of PDEs: Elimination of arbitrary constants, Elimination of arbitrary functions; Solution concepts of PDEs: Complete solution / integral, particular integral, general integral and singular integral, PDEs solvable by direct integration; Linear PDEs of first order (Lagrange's linear equation): Method of grouping and method of multipliers; Nonlinear PDEs of first order: Solution methods of solving PDEs in standard forms I, II, III & IV (as is specified in Text Book 1).

UNIT-V: PARTIAL DIFFERENTIAL EQUATIONS -HIGHER ORDER

Homogeneous Linear Partial Differential Equations of second and higher order with constant coefficients: Symbolic form, Rules for finding complementary function, Rules for finding particular integral, working procedure to get complete solution; Solving

nonhomogeneous linear PDEs of second and higher order with constant coefficients; Method of separation of variables: concept of boundary value problem, solving boundary value problems by separating variables.

//Topics prefixed with 'outlines / overview' are not for assessment//

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017
2. T.K.V. Iyengar et al, Engineering Mathematics, S. Chand Publishers, Revised edition

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010
3. T. Veerarajan, Higher Engineering Mathematics, Tata McGraw-Hill, 2008

COURSE OUTCOMES: At the end of course, students shall be able to

CO1	Recall the concepts of numerical methods.
CO2	Recall the concepts of multivariable calculus.
CO3	Recall solution methods of PDEs.
CO4	Use the concepts of numerical methods to solve equations, do interpolation & numerical integration and also to solve ODEs numerically.
CO5	Use the concepts of multivariable calculus to find maxima & minima of a multivariable function.
CO6	Use solution methods of PDEs to solve BVPs.
CO7	Apply the concepts of numerical methods, multivariable calculus and PDEs to solve real world problems including BVPs.

CO/PO Mapping

Course Title:				MATHEMATICS-II (MEC,ECE,EEE,CHE & CIV)										
Course Code:				A2MAT102										
Course Designed by				Dept. of Mathematics										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2							2			
CO2	3	3		2							2			
CO3	3	3		2							2			
CO4	3	3		2							2			
CO5	3	3		2							2			
CO6	3	3		2							2			
CO7	3	3		2							2			

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 06.07.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PYI101	SEMESTER – II	L	T	P	C
	ENGINEERING PHYSICS (COMMON TO CE, ME & CHEM)	3	-	-	3
	Total Contact Hours – 48				

SYLLABUS

Unit – I: CRYSTALLOGRAPHY [8 hrs]

Introduction- Crystal systems- Bravais lattices- Packing fractions of simple, body centered, face centered cubic structures - Directions and Planes in crystals- Miller indices- Inter planar spacing- Bragg's Law of X-Ray diffraction- Powder X-Ray diffraction method.

Unit –II: LASER & FIBER OPTICS [10hrs]

LASER: Introduction- Absorption, Spontaneous and stimulated emission of radiation- Einstein coefficients- Population inversion- Basic components of laser- Nd YAG Laser – CO_2 Laser- Applications of LASER.

FIBER OPTICS: Introduction- Principle of optical fiber- Numerical Aperture- Acceptance angle- Classification of optic fibers- Applications of fibers.

Unit-III: ULTRASONICS & ACOUSTICS [10hrs]

Ultrasonics-Introduction- Properties of ultrasonic sounds- Generation of Ultrasonic sounds- Magnetostriction- Piezoelectric effect- Detection- Kunts tube- Converse piezoelectric method- Ultrasonic Nondestructive testing technique (pulse-echo technique under reflection mode)- Applications.

ACOUSTICS- Introduction– Reverberation- Reverberation time- Sabines formula for reverberation time- Absorption coefficient and its measurement- Factors effecting acoustic design of hall.

Unit – IV: THERMODYNAMICS [10hrs]

Introduction- First Law- Isothermal process- Adiabatic process- Work done- Second Law- Carnot's heat engine- Efficiency- Entropy- Physical significance- Entropy and second law- Temperature entropy diagram- Third Law of Thermodynamics- Applications of thermodynamics.

Unit – V: PRINCIPLES OF MECHANICS [10hrs]

Introduction- System of forces- Resultant of coplanar forces- Method of resolution- Parallel forces- Moment of force- Varignon theorem- Force system in space- Friction- Limiting friction & Impending motion- Coulomb's laws of dry friction- Coefficient of friction- Cone of friction- Types of friction (qualitative).

TEXTBOOKS

1. Engineering Physics by R.K. Gaur and S.L. Gupta, Dhanpat Rai Publications.

REFERENCES

1. RESNICK, HALLIDAY and WALKER, Principles of Physics, Wiley Publishers
2. A.NELSON, Engineering Mechanics: Statics & Dynamics by, Tata Mc Graw Hill Publishers.
3. P.K. NAG, Engineering Thermodynamics, Mc. Graw Hill Publishers

COURSE OUTCOMES:

CO1. The student will be able to recognize the underlying principles of crystalline solids, LASER production and Optical fibers

CO2. The student will be able to gain knowledge on the fundamentals of acoustics and production & detection of ultrasonics

CO3. The student will be able to describe the essentials of thermodynamics, force systems and friction.

CO4. The student will be able to understand crystal structures and X-ray diffraction as a tool for crystal structure analysis.

CO5. The student will be able to understand the importance of industrially relevant LASERS, applications of optical fibers and the prominence of ultrasonics in nondestructive testing.

CO6. The student will be able to understand basic processes involved in thermo-dynamical systems and force systems

CO7. The student will have the ability to apply the conceptual knowledge of forces and its related physical quantities in solving engineering problems.

CO/PO MAPPING:

Course Title:	Engineering Physics													
Course Code:	A2PYI101													
Course Designed by	Dept. of Physics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3						1				1		
CO2	3	3						1				1		
CO3	3	3						1				1		
CO4	3	3						1				1		
CO5	3	3						1				1		
CO6	3	3						1				1		
CO7	3	3						1				1		

Course designed by	DEPARTMENT OF PHYSICS
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PYI101	SEMESTER – II	L	T	P	C
	ENGINEERING PHYSICS LAB	-	-	3	2
	Total Contact Hours – 42				

LIST OF EXPERIMENTS

1.	Determination of size of the micro dimensional system by Laser diffraction.
2.	Determination of numerical aperture and acceptance angle of the optic fiber.
3.	Determination of lattice constants of the crystal systems.
4.	Verification of laws of transverse vibrations in stretched strings by using Sonometer.
5.	Determination of velocity of ultrasonic sounds in liquids by acoustic grating method
6.	Determination of thermal conductivity coefficient of the disc shaped material.
7.	Determination of specific heat of the given liquid by Newton's law of cooling principle.
8.	Determination of temperature coefficient resistance for the thermistor.
9.	Determination of the static friction coefficient.
10.	Determination of rigidity modulus of the wire shaped material by using Torsional pendulum.

TEXTBOOKS:

1. BALASUBRAMANIAN.S, SRINIVASAN.M..N, A Text book of Practical Physics, S Chand Publishers, 2017

REFERENCES:

1. https://vlab.amrita.edu.

COURSE OUTCOMES:

CO1. Design experiments to determine the size of the micro-dimensional system and the parameters impelling communication through optic fibre.

CO2. Investigate the powder X-Ray diffraction patterns for crystal structure analysis.

CO3. Design experiments for demonstration of mechanical resonance and determine the velocity of ultrasonic sounds in liquid media.

CO4. Design experiments to determine physiognomies of materials like the thermal conductivity coefficient (K), specific heat (s) and temperature coefficient of resistance (α).

CO5 Design experiments to determine the mechanical properties like the rigidity modulus (η) and the static friction coefficient (μ_s).

CO/PO MAPPING:

Course Title:	Engineering Physics Lab													
Course Code:	A2PYI101													
Course Designed by	Dept. of Physics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3						1	2	1		1		
CO2	3	3						1	2	1		1		
CO3	3	3						1	2	1		1		
CO4	3	3						1	2	1		1		
CO5	3	3						1	2	1		1		

Course designed by	DEPARTMENT OF PHYSICS
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CIT201	SEMESTER – II	L	T	P	C
	PROGRAMMING FOR PROBLEM SOLVING	3	0	0	3
	Total Contact Hours : 54				
	Prerequisites: Mathematics				

COURSE OBJECTIVES	
COBJ1.	Students will study systematic approach to problem solution specification using finite number of unambiguous steps.
COBJ2.	Students will gain understanding of procedural language features using C as the template.
COBJ3.	Students will read and analyse alternative construct choices in procedural language C.
COBJ4.	Students will get exposure to systematic approach of automated solution design, implementation and testing using a procedural language.

SYLLABUS

UNIT – I: [9 HOURS]

INTRODUCTION: Introduction to Programming, Computer System, Hardware and Software concepts.

PROBLEM SOLVING: Algorithm, Pseudo-code, flow-chart, program development steps, high-level, Assembly and machine languages.

BASICS OF C PROGRAMMING: Structure of C program, identifier, basic data types and sizes, constants, variables, arithmetic operators, relational operators, logical operators, increment and decrement operators, assignment operator, conditional operator, scanf and printf built-in functions, Creating and running programs.

UNIT – II: [9 HOURS]

BIT-WISE OPERATORS: logical, shift, rotation, masks.

EXPRESSIONS: expressions, type conversions, conditional expressions, precedence and order of evaluation.

SELECTION: Two-way selection: if-else, nested if, examples, multi-way selection: switch, else-if, examples.

ITERATIVE: loops - while, do-while and for statements, break continue, event and counter controlled loops.

UNIT – III: [18 HOURS]

Part – I: [9 HOURS]

ARRAYS: Arrays (1-D, 2-D), Character arrays and Strings, Searching (Linear Search and Binary Search).

Part – II: [9 HOURS]

BASIC ALGORITHMS: Basic Sorting Algorithms (Bubble, Insertion and Selection), comparing algorithms for complexity.

FUNCTIONS: Functions, Scope and Extent of Variables, Function Parameters, parameter passing using call-by-value, sub-routines, Storage Classes,#define,#ifdef, #ifndef pre-processor directives.

UNIT – IV: [9 HOURS]

RECURSION: Definition of Recursion, example programs using recursion like finding Factorial, Fibonacci series, Quick sort, puzzle solving using recursive functions (towers of hanoi, ackerman function).

POINTERS: Definition of Pointers, Pointer Type, Pointer Arithmetic, Function parameter passing using call-by-reference.

MEMORY ALLOCATION: Difference between static and dynamic memory allocation, dynamic memory allocation using built-in functions, dangling pointer, unreferenced memory problem.

UNIT – V: [9 HOURS]

ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, bit-fields, concept of linked list, program applications.

FILE-HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, command line arguments.

Suggested Text Books

1. Programming For Problem Solving, Behrouz A.Forouzan & Richard F.Gilberg, Cengage Publishers, 3rd Edition
2. Programming In C:A Practical Approach, Ajay Mittal, Pearson Education

Suggested Reference Books

1. Brian W. Kernighan And Dennis M. Ritchie, The C Programming Language, Prentice Hall Of India

2. Introduction To C Programming, Reema Thareja, Oxford University Press

3. E. Balaguruswamy, Programming In Ansi C, Tata Mcgraw-Hill

COURSE OUTCOMES

The student will

1. Have the ability to **describe** a formal algorithmic solution for the given problem, **list** the features of C including scalar & vector data types, operators, **Outline** expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.

2. Have the ability to **describe** one and two-dimensional arrays, **outline** loops and arrays for searching and **describe** various sorting techniques.

3. Have the ability to **outline** the purpose of functions, pointers, command line arguments, dynamic memory allocation. **Define** storage classes. **Describe** command like arguments, structures, unions, and enumeration. Have knowledge of handling files.

4. Have the ability to **solve** complex expressions, **design** algorithms and **develop** programs in C language using the basic constructs, data types, operators, control & iterative statements, and arrays.

5. Have the ability to **apply** arrays to solve complex matrix related problems and strings. **Compare and contrast** various searching and sorting techniques for complexity.
6. Have the ability to **distinguish between** function call types. **Draw inferences on** command line arguments, storage classes, and pre-processor directives. **Use** pointers with functions, arrays, strings, to **solve** complex problems. **Give example** and **solve** classical recursion problems**. Compare and contrast** static and dynamic memory allocation, and **apply** them. **Use** structures and unions to implement and **solve** real-time problems. **Apply** file related functions to process files.

7. Have the ability to **Fully appreciate** the art of procedural programming in C and develop programs **optimally** using the full feature set of C language.

Course Title:	Programming for problem solving (Common to ALL Branches)														
Course Code:	A2CIT201														
Course Designed by	Dept. of Computer Science and Engineering														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSOM	PSON	PSOO
CO1	3	3						3	2	1		2	1	1	1
CO2	3	3						3	2	1		2	1	1	1
CO3	3	3						3	2	1		2	1	1	1
CO4	3	3	3	3	3	3	3	3	2	1	1	2	3	3	3
CO5	3	3	3	3	3	3	3	3	2	1	1	2	3	3	3
CO6	3	3	3	3	3	3	3	3	3	1	1	2	3	3	3
CO7	3	3	3	3	3	3	3	3	3	1	1	3	3	3	3

Levels of Correlation: High-3, Medium-2, Low-1

PROGRAMMING FOR PROBLEM SOLVING PRACTICE

COURSE OBJECTIVES	
1.	To use basic data types, operators, expressions and expression evaluation mechanisms using C Programming Language.
2.	To implement control flows construct in C Programming Language and understand the syntax, semantics and usability contexts of these different construct.
3.	To develop composite data types in C and constructs available to develop their data-types, utilize them to model things and dealing with data from and to external files.
4.	To design programs with different variations of the constructs available for practicing modular programming and understand the pros and cons of using different variants and apply optimization.

UNIT – I

WEEK 1:

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using computers
Lab1: Familiarization with programming environment

i) Exposure to Turbo C, gcc, Code Blocks IDE
ii) Writing simple programs using printf(), scanf()

WEEK 2:

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments/Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts
Lab1: Converting algorithms/flowcharts into C Source code

Developing the algorithms/flowcharts for the following sample programs

i. Sum and average of 3 numbers
ii. Conversion of Fahrenheit to Celsius and vice versa
iii. Simple interest calculation

WEEK 3:

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:
Lab 3: Simple computational problems using arithmetic expressions

i) Finding the square root of a given number
ii) Finding compound interest
iii) Area of a triangle using heron's formulae
iv) Distance travelled by an object

UNIT – II

WEEK 4:

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and their precedence and associativity:
Lab 4: Simple computational problems using the operator's precedence and associativity

i) Evaluate the following expressions
   a. A+B*C+(D*E)+F*G
   b. A/B*C-B+A*D/3
ii) a. A+++B---A
   b. J=(i++)+(++i)
iii) Find the maximum of three numbers using conditional operator
iv) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5:

Objective: Explore the full scope of different variants of "if construct" namely if-else, null-else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures

i) Write a C program to find the max and min of four numbers using if-else
ii) Write a C program to generate electricity bill
iii) Find the roots of the quadratic equation
iv) Write a C program to simulate a calculator using switch case
v) Write a C program to find the given year is a leap year or not

WEEK 6:

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops:
Lab 6: Iterative problems e.g., the sum of series

i) Find the factorial of given number using any loop
ii) Find the given number is a prime or not
iii) Compute sine and cos series
iv) Checking a number palindrome
v) Construct a pyramid of numbers

UNIT – III

WEEK 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1D Arrays: searching
Lab 7: 1D Array manipulation, linear search

i) Find the min and max of a 1-D integer array
ii) Perform linear search on1D array
iii) The reverse of a 1D integer array
iv) Find 2's complement of the given binary number
v) Eliminate duplicate elements in an array

WEEK 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2D arrays, Sorting and Strings
Lab 8: Matrix problems, String operations, Bubble sort

i) Addition of two matrices
ii) Multiplication two matrices
iii) Sort array elements using bubble sort
iv) Concatenate two strings without built-in functions
v) Reverse a string using built-in and without built-in string functions

UNIT-IV

WEEK 9:

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 9: Functions, call by value, scope and extent,
Lab 9: Simple functions using call by value, Solving differential equations using Eulers theorem

i) Write a C function to calculate NCR value
ii) Write a C function to find the length of a string
iii) Write a C function to transpose of a matrix
iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 10:

Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 10: Recursion, the structure of recursive calls

Lab 10: Recursive functions

i) Write a recursive function to generate Fibonacci series
ii) Write a recursive function to find the lcm of two numbers
iii) Write a recursive function to find the factorial of a number
iv) Write a C Program to implement Ackermann function using recursion
v) Write a recursive function to find the sum of series.

WEEK 11:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 11: Call by reference, dangling pointers
Lab 11: Simple functions using Call by reference, Dangling pointers

i) Write a C program to swap two numbers using call by reference
ii) Demonstrate Dangling pointer problem using a C program
iii) Write a C program to copy one string into another using pointer
iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

UNIT – V

WEEK 12:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc(), calloc(), realloc() and free() functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 12: Pointers, structures and dynamic memory allocation
Lab 12: Pointers and structures, memory dereference

i) Write a C program to find the sum of a 1D array using malloc()
ii) Write a C program to find the total, average of n students using structures
iii) Enter n students data using calloc() and display failed students list
iv) Read student name and marks from the command line and display the student details along with the total.
v) Write a C program to implement realloc()

WEEK 13:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly-linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 12: Bitfields**,** Self-Referential Structures, Linked lists
Lab 12: Bitfields, linked lists

i) Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit-fields
ii) Create and display a singly linked list using self-referential structure
iii) Demonstrate the differences between structures and unions using a C program
iv) Write a C program to shift/rotate using bitfields
v) Write a C program to copy one structure variable to another structure of the same type.

WEEK 14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling:
Lab 14: File operations

i) Write a C program to write and read text into a file
ii) Write a C program to write and read text into a binary file using fread() and fwrite()
iii) Copy the contents of one file to another file
iv) Write a C program to merge two files into the third file using command-line arguments
v) Find no. of lines, words and characters in a file
vi) Write a C program to print last n characters of a given file.

TEXTBOOKS:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

REFERENCES:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India
2. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

COURSE OUTCOMES

CO1.	**Demonstrate** the ability to write a formal algorithmic solution for the given problem, **name & explain** the features of C like types including scalar & vector types, operators, expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.
CO2.	**Implement** one and two-dimensional arrays to solve simple mathematical and matrix related problems. **Make use of** loops and arrays for searching and **Compare** various sorting techniques.
CO3.	**Identify** the purpose of functions, pointers, command line arguments, dynamic memory allocation. **Define** storage classes. **Understand** command like arguments, structures and unions. Have **knowledge** of handling files.
CO4.	**Design** algorithms and **develop** programs in C language using the basic constructs, data types, operators, control statements, and arrays.
CO5	**Apply** pointers, functions, derived data types, and dynamic memory allocation, **design** solutions to challenging problems.
CO6	**Illustrate** the art of procedural programming in C and **develop** programs optimally using the full feature set of C language.

Course Title:	Programming for problem solving lab														
Course Code:	A2CII201														
Course Designed by	Dept. of CSE & IT														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2	3	1	1	1	2	2			2	2	2
CO2	3	3	1	2	3	1	1	1	2	2			2	2	2
CO3	3	3	2	3	3	2	1	1	2	2			3	3	3
CO4	3	3	2	3	3	3	1	1	2	2			3	3	3
CO5	3	3	3	3	3	3	1	1	2	2			3	3	3
CO6	3	3	3	3	3	3	1	1	3	3	3		3	3	3

Levels of Correlation: High-3, Medium-2, Low-1

Course designed by	DEPARTMENTS OF CSE & IT
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019

A2EHL001	SEMESTER - II	L	T	P	C
	Essential Communication in English	1	-	3	3
	Total Contact Hours – 60				

SYLLABUS

UNIT – I: BASIC LANGUAGE SKILLS – A REFRESHER

Organs of Speech: Consonant Sounds &Vowel Sounds; Phonemic Transcription; Using a Dictionary to know the Pronunciation of a word

Presenting Oneself: Introducing oneself -Using different expressions in Formal&Informal Contexts.

Reading a News Article: Identifying the key words and their usage; summarizing the information

Word Study & Mind Mapping: Root words–Derivatives; Homonyms, Homographs, Homophones; Synonyms & Antonyms

UNIT – II: RUDIMENTS OF FUNDAMENTAL COMMUNICATION

The World: Listening & watching Documentaries on World famous Places.

Describing People, Places and Life experiences: Physical Description- Describing someone's qualities – Usage of Jargon to present topography.

Short Story Corner: Reading a short story – Understanding the mood and essence – Sharing different perspectives.

Sentence Patterns: Concord – Rules – Common errors in day-day usage

UNIT-III: COMMUNICATION AT PRACTICE

Oratory Skills: Listening to World's Famous Speeches

JAM (Just a Minute) Talk: Format & Delivery Techniques

Nuances of Language: Company Description –Position Description (Formal) – processes like Chocolate Making(Informal)**.**

Types of Sentences – Declarative, Interrogative, Assertive etc.

UNIT-IV: COMMUNICATION THROUGH CONCEPTUAL LEARNING

BBC English: Watching interviews of Famous people.

Dialogue Practice: Situational Dialogues; Structuring a Role Play

New Inventions: Reading about latest technology pertaining to different fields (Source : Science Journals)

Transformation of sentences: Active Voice-Passive Voice**,** Direct & Indirect Speech**,** Degrees of Comparison**,** Simple Compound & Complex Sentences.

UNIT – V: COMMUNICATION THROUGH LIFE SKILLS

Watching Movies for Language Enrichment & Writing Reviews.

Skits: Enacting a Skit on a Social Issue

Reflections: Reading News Paper Editorial columns, Literacy Reviews, Poetry

Presenting an autobiography: Exploring different styles of writing autobiographies and evolving an own style**.**

TEXT BOOK:
Reference Source Compilation by the Department

REFERENCES:
1. **Fundamentals of Technical Communication** by Meenakshi Raman,OUP.
2. **Living English Structure** by W.Stannard Allen, Pearson Publications.
3. **English Made Easy** by Mary Margaret Hosler, Mc Graw Hill.
4.. **English and Communication Skills for Students of Science and Engineering**, by Dhanavel, S.P. Orient Blackswan Ltd.
5. **The Oxford Guide to Writing and Speaking** by John Seely , OUP

COURSE OUTCOMES:

CO1. Student will be able to come to terms with the basic language Skills required to cater to the requirement of the programme undertaken.

CO2. Student will be able to comprehend and analyze the core concepts well.

CO3. Student will be able to gain proficiency in all four skills of Language – Listening, Reading, Speaking and Writing.

CO4. Student will be able to understand the Syntactical and Grammatical Components of English Language and their correct use.

CO5: Student will be able to present his/her ideas confidently in a Professional manner.

CO/PO Mapping

Course Title:				**Essential Communication in English**										
Course Code:				A2EHL001										
Course Designed by				Dept. of English & Humanities										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2		2	3	3		3		
CO2						2		2	3	3		3		
CO3						2		2	3	3		3		
CO4						2		2	3	3		3		
CO5						2		2	3	3		3		

Course designed by	DEPARTMENT OF ENGLISH & HUMANITIES
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2MED201	SEMESTER - II	L	T	P	C
	COMPUTER AIDED ENGINEERING GRAPHICS	1	-	3	3
	Total Contact Hours – 60				

SYLLABUS

UNIT-I

Overview of Computer Graphics:

Computer technologies that impact on graphical communication, Demonstrating knowledge of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line, The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.

Set up of the drawing page and the printer, Scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing.

Applying dimensions to objects, applying annotations to drawings;

UNIT-II

Layers: Setting up and use of Layers, layers to create drawings, create, edit and use customized layers, concept of view ports.

Introduction to Orthographic Projections: Projections of Points; Projections of Straight Lines parallel to both planes; Projections of Straight Lines-Parallel to one and inclined to other plane.

UNIT-III

Projections of Straight Lines and Planes: Lines inclined to both planes, determination of true lengths, angle of inclinations and traces, Projections of Planes

UNIT-IV

Projections and sections of solids: Projections of simple solids- Sections of solids

UNIT -V

Development of surfaces, Isometric Projection and Conversion of Isometric Views to Orthographic Views: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa

TEXT BOOKS

1. DM Kulkarni, AP Rastogi, AK Sarkar "Engineering graphics with Auto CAD" PHI Publishers
2. Bhatt N.D., Panchal V.M. & Ingle P.R "Engineering Drawing" Charotar Publishing House.

REFERENCE BOOKS

1. Shah, M.B. & Rana B.C "Engineering Drawing and Computer Graphics", Pearson Education.
2. Agrawal B. & Agrawal C. M "Engineering Graphics", TMH Publication.
3. Narayana, K.L. & P Kannaiah "Engineering Drawing", SciTech Publishers.
4. CAD Software Theory and User Manuals.

COURSE OUTCOMES

At the end of the course the students will be able to:

CO1: Prepare two dimensional drawings using draw and modify commands in Auto CAD software and represent dimensions to the drawings

CO2: Clearly differentiate different types of projections and get solutions to projections of points in Auto CAD by applying the layers concept

CO3: Solve problems related to projections of straight lines and planes

CO4: Prepare simple solids in CAD software and obtain solutions to projections and sections of solids

CO5: Develop the surfaces of simple solids, prepare Isometric drawings and convert isometric drawings into orthographic views

CO/PO Mapping

Course Title:	Computer Aided Engineering Graphics													
Course Code:	A2MED201													
Course Designed by	Dept. of Mechanical Engineering													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2		3	1		1	2	3	2	2	3	2
CO2	3	2	2		3	1		1	2	3			2	1
CO3	3	2	2		3	1		1	2	3			2	1
CO4	3	2	3		3	1		1	2	3	2	2	3	1
CO5	3	2	3		3	1		1	2	3	2	2	3	1

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

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B.Tech(ECE)

MAHARAJ VIJAYARAM GAPATHI RAJ COLLEGE OF ENGINEERING(AUTONOMOUS)
Vijayaram Nagar Campus, Chintalavalasa, Vizianagaram-535005, Andhra Pradesh
Accredited by NAAC with 'A' Grade & Listed u/s 2(f) & 12(B) of UGC
(Approved by AICTE, New Delhi and Permanently Affiliated by JNTUK-Kakinada)
NBA Accredited UG Courses: B.Tech(MEC), B.Tech(CIV), B.Tech(EEE), B.Tech(ECE), B.Tech(CSE), B.Tech(IT), B.Tech(MEC) & B.Tech(CHE) and PG Course: MBA

ACADEMIC REGULATIONS & CURRICULUM

Applicable to the students admitted from the Academic Year 2019-2020

ELECTRONICS AND COMMUNICATION ENGINEERING

(B.Tech. Programme)

MAHARAJ VIJAYARAM GAJAPATHI RAJ COLLEGE OF ENGINEERING

(Autonomous)

(Approved by AICTE, New Delhi, and permanently affiliated to JNTUK, Kakinada)

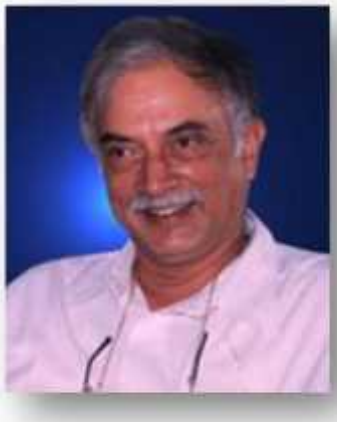
Listed u/s 2(f) & 12(B) of UGC Act 1956.

Vijayaram Nagar Campus, Chintalavalasa,Vizianagaram-535005, Andhra Pradesh

The visionaries

Late Dr. P V G Raju
Raja Saheb of Vizianagaram
Founder Chairman-MANSAS
Ex-Minister for Education and Health, Govt. of AP
Ex Member of Parliament

Late Dr. P. Anand Gajapathi Raju
Ex-Chairman-MANSAS
Ex-Minister for Education and Health
Govt. of AP
Ex Member of Parliament



P. Ashok Gajapathi Raju
Chairman-MANSAS
Ex-Union Minister for Civil Aviation,
Govt. of India
Ex-Minister for Finance, Govt. of AP

Vision

Maharaj Vijayaram Gajapathi Raj College of Engineering strives to become a centre par excellence for technical education where aspiring students can be transformed into skilled and well-rounded professionals with strong understanding of fundamentals, a flair for responsible innovation in engineering practical solutions applying the fundamentals, and confidence and poise to meet the challenges in their chosen professional spheres.

Mission

The management believes imparting quality education in an atmosphere that motivates learning as a social obligation which we owe to the students, their parents/guardians and society at large and hence the effort is to leave no stone unturned in providing the same with all sincerity. Towards that end, the management believes special focus has to be on the following areas:

M1: Have on-board staff with high quality experience and continuously updating themselves with latest research developments and sharing that knowledge with students.

M2: Having a well stream-lined teaching learning process that is continuously assessed for effectiveness and fine-tuned for improvement.

M3: Having state-of-the-art lab and general infrastructure that gives students the necessary tools and means to enhance their knowledge and understanding.

M4: Having a centralized department focused on improving placement opportunities for our students directly on campus and coordinating the training programs for students to complement the curriculum and enhance their career opportunities.

M5: Having advanced research facilities and more importantly atmosphere to encourage students to pursue self-learning on advanced topics and conduct research.

ABOUT THE INSTITUTION:

Maharajah Alak Narayan Society of Arts and Science (MANSAS) is an Educational Trust founded by Dr. (late) P.V.G Raju, Raja Saheb of Vizianagaram in the hallowed memory of his father Maharajah Alak Narayan Gajapati with a view to confound socio-economic inequalities in the Vizianagaram principality executing a trust deed on 12-11-1958 duly established Maharajah's College and other educational institutions in and around Vizianagaram. The Trust is a charitable one published under Section 6 a (1) of A.P Charitable and Hindu Religious Institutions and Endowment Act 30 of 1987.

The object of the Trust is to manage the properties of educational institutions under it and to promote and advance the cause of education in general, besides awarding scholarships to deserving students enabling them to undergo special training in science and industries in and out of India. The Trust has made an uncompromising contribution to the nation by presenting the stalwarts.

Trust offers KG to PhD level education in Arts, Sciences, Law, Pharmacy, Humanities Education, Engineering and Management and presently houses 13 Educational Institutions. MVGR College of Engineering is one of the 13 Institutes.

Other Institutions under MANSAS

1. M.R. HIGH SCHOOL 1857
2. M.R COLLEGE **(NAAC ACCREDITED)** 1879
3. M.R. COLLEGE OF EDUCATION 1950
4. M.R. WOMENS COLLEGE **(NAAC ACCREDITED)** 1962
5. M.R. GIRLS HIGH SCHOOL 1974
6. M.R. MODEL HIGH SCHOOL 1974
7. M.R. ENGLISH MEDIUM SCHOOL 1979
8. M.R.V.R.G.R LAW COLLEGE 1987
9. M.R. P.G. COLLEGE **(NAAC ACCREDITED)** 1987
10. M.R.SCHOOL OF MANAGEMENT STUDIES 1994
11. M.R.V.R.G.R – II MEMORIAL JR. COLLEGE 1994
12. M.R. COLLEGE OF PHARMACY 2004

Maharaj Vijayaram Gajapathi Raj (MVGR) College of Engineering was established in the year 1997 by Maharaj Alak Narayan Society for Arts and Sciences (MANSAS) to impart quality technical education. The Institution is located in lush green, serene and pollution free environment spread over 60 acres of land in Chintalavalasa village situated in the outskirts of Vizianagaram, a fort city in the north coastal region of Andhra Pradesh.

Institution at a glance:

- MVGR is a 22 years old institution, established in 1997
- All eligible UG Programs (CHEMICAL, CIV, CSE, ECE, EEE, IT & MECHANICAL) were reaccredited by NBA.
- MBA program was also re-accredited by NBA.
- Had been re-accredited with Grade 'A' by NAAC of UGC
- Has Permanent affiliation with JN Technological University-Kakinada
- Listed under sections 2(f) & 12(b) of UGC act 1956.
- Approved by AICTE-New Delhi
- EIGHT departments are recognized as RESEARCH CENTERS by JNTU-K
- Granted Autonomy by UGC in 2015
- Campus of 60 acre
- Offering 7 UG and 5 M.Tech., and 1 MBA program
- About 250 faculty of which 84 Ph.D. Degree holders
- 83 Laboratories with an investment of about 13 Crores
- Total built up area of about 7 Lakh Sft
- About 42,000 volumes and Access to 8 international online journal packages like IEEE, SPRINGER, etc.
- 1420 Systems & 395 Mbps band width internet facility
- About Rs. 4 Crore worth of on-going R&D projects
- Actively involved in civil engineering consultancy work as Third Party Quality Auditor for Vizianagaram Municipality
- WIPRO Recognized technology learning center and MISSION 10X partner institution
- Recognized National Instruments Academy for Training in LabView
- SIRO Recognition by DSIR
- Recognized PTC Centre of Excellence for Creo Training
- Identified by MSME as Business Incubation Centre
- APSSDC-Siemens Technical Skill Development Institute
- Recognized CMs SKILL EXCELLENCY CENTER (SEC)
- Microsoft Ed-vantage Platinum Partner
- Institutional member of IUCEE
- Institutional Member of CII
- Member, Chamber of Commerce, Vizianagaram
- Green Campus award by Govt. of AP

MVGR College of Engineering is rated as one among the best engineering colleges in the state of Andhra Pradesh as it set up highest standards in all areas of curricular, co-curricular and extra-curricular activities and in students' placements. Based on industry and expert's feedback, the college is updating the curriculum from time to time. The college offers many value added add-on courses students and conducts training programs to meet the industries' requirements.

Academic Regulations for B.Tech., Program

Applicable to the students admitted from the Academic year 2019-2020 onwards.

1. PROGRAM STRUCTURE:

B.Tech.:

Sl. No	Category	Credits
1	Humanities and Social Sciences including Management courses	12
2	Basic Science courses	25
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	26
4	Professional core courses	54
5	Professional Elective courses relevant to chosen specialization/branch	18
6	Open subjects – Electives from other technical and /or emerging subjects	12
7	Project work, seminar and internship in industry or elsewhere	13
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	0
	Total	160

- Open electives offered by the parent department are listed in the course structure and are offered to students of other programs. The students of parent departments may also opt the course, provided it shall not be listed in the curriculum.
- For audit course a student is deemed to satisfy the minimum contact hours, as prescribed by the department and shall also comply with the requirements for submission of assignments/projects. A student shall also opt for MOOCs and submit the certificate.

1. HSS Courses		
Sl. No.	Subject	Credits
1	English -1	3
2	English -2 (Technical English)	3
3	Elective-1 (Management Related course (MEFA or MS or Operations Research)	3
4	Elective-2 (Professional Ethics and Human Values)	3
	Total	**12**

2. Basic Science Courses		
Sl. No.	Subject	Credits
1	Mathematics-I	3
2	Mathematics-II	3
3	Mathematics-III	3
4	Mathematics-IV	3
5	Applied / Engineering Physics (Theory + Lab)	5
6	Engineering Chemistry (Theory + Lab)	5
7	Biology for Engineers	3
	Total	**25**

3. Engineering Science Courses		
Sl. No.	Subject	Credits
1	Programming for Problem Solving (Theory + Lab)	5
2	Internet of Things (IOT)	3
3	Computer aided Engineering Graphics	3
4	Basic Electrical Engineering (Theory + Lab)	5
5	Department wise Engineering Science Course-I (AI Tools , Techniques & Applications)	5
6	Department wise Engineering Science Course-II (Design thinking and Product Innovation)	3
7	Workshop (Department Specific)	**2**
	Total	**26**

	Subjects	Credits
4	**Professional Core Courses**	54
5	**Professional Elective Courses Relevant to Chosen Specialization/Branch**	18
6	**Open Subjects – Electives from other Technical and / or Emerging Subjects**	12
		84

7. Project		
Sl. No.	Subject	Credits
1	Socially Relevant Project	1
2	Mini Project	2
3	Project Phase - I	2
4	Project Phase - II	8
	Total	**13**

8. Audit Courses (Non Credit Course)		
Sl. No.	Subject	
1	Induction Program	
2	Constitution of India	
3	Indian Traditional Knowledge	
4	Environmental Science	

BOS Chairman shall notify the list of MOOCs offered (Open Elective & Professional Elective) in the beginning of the semester.

2. PROGRAM PATTERN:

B.Tech.: The program is for 4 academic years / 8 semesters.

B.Tech. (Lateral Entry): The program is for 3 academic years / 6 semesters.

3. AWARD OF DEGREE:

B.TECH:

A student will be declared eligible for the award of degree if he/she fulfills the following academic regulations.

a) A student shall be declared eligible for the award of degree, if he/she pursues a course of study for not less than four academic years and not more than eight academic years from the date of admission.

b) The student shall register for **160** credits and secure all **160** credits.

c) A student shall also register and successfully complete audit programs (Non-credit) as recommended by Academic Council.

d) A student on completing 1st year class work may opt for a break of 1 year which shall be deemed as GAP year, as recommended by APSCHE, for undertaking successful entrepreneurial ventures.

e) Students who fail to complete Four Years Course of study within 8 years shall forfeit their seat and their admission shall stand cancelled.

B.TECH (Lateral Entry):

A student will be declared eligible for the award of degree on fulfilling the following academic requirements.

a) A student shall be declared eligible for the award of the degree, if he/she pursues a course of study for not less than three academic years and not more than six academic years.

b) The student shall register for **126** credits and secure all **126** credits.

c) A student shall also register and successfully complete audit programs (Non-credit) as recommended by Academic Council.

d) Students who fail to complete their three Years Course of study within 6 years shall forfeit their seat and their admission shall stand cancelled.

e) Student shall register for bridge programs, if any, as administered by the respective departments at the beginning of 2nd year and successfully complete as per the guidelines of the Institution.

4. CERTIFICATION PROGRAMS:

Sl. No.	Dept.	Name of the Program
1	MECH	Windchill 10.2 PDM by Adroitec Engineering Solutions Pvt. Ltd., Hyderabad
2	MECH	Creo 2.0 by PTC
3	MECH	Edgecam by Verosoft, UK
4	MECH	ANSYS Training and Certification by Mechanical Department
5	MECH	AUTOCAD Training and Certification by Mechanical Department
6	MECH	Catia by APSSDC-Dassault Systems, CM's Center of Excellence
7	MECH	Delmia by APSSDC-Dassault Systems, CM's Center of Excellence
8	MECH	Simulia by APSSDC-Dassault Systems, CM's Center of Excellence
9	MECH	2-Wheeler Automobile Certification by APSSDC-SIEMENS
10	MECH	4-Wheeler Automobile Certification by APSSDC-SIEMENS
11	MECH	Welding Certification by APSSDC-SIEMENS
12	MECH	CNC Certification by APSSDC-SIEMENS
13	MECH	Commercial Electrical Certification by APSSDC-SIEMENS
14	MECH	Solid Edge Certification by APSSDC-SIEMENS
15	CHEM	Chemical Process Design and Simulation by Simtech Simulations, Hyderabad
16	ECE	Embedded Systems by Think LABS, Mumbai
17	ECE	Labview by National Instruments Systems India Pvt. Ltd.
18	ECE	Unified Technology Learning Program (UTLP) by Wipro Mission 10X
19	CSE, IT	PEGA by Virtusa Corporation
20	CSE, IT	Microsoft technologies by Microsoft Corp.
21	CSE, IT	Ethical Hacking by EC-Council Academia
22	CSE, IT	Java and C by Talent Sprint
23	CSE, IT	Network Analyst (CCNA) by Cisco Systems Inc
24	CSE, IT	Java Programming (OCJP) and DBMS by Oracle
25	EEE	PLC, Drives and Automation by Siemens
26	EEE	PLC by New Dawn Automation
27	EEE	Home Electrical Certification by APSSDC-SIEMENS
28	Civil	Remote Sensing and GIS by Indian Institute of Remote Sensing

a) The Institution shall offer the certification programs by itself or in collaboration with industry/such other Institutions deemed to have specialized expertise in the proposed area of training.
b) Only students of the Institution shall be eligible to register on payment of prescribed fee.
c) However, subject to availability of resources and the demand the Institution may offer the program to external candidates meeting the pre-qualification requirements and in the order of the merit.
d) The duration of the course and design of the content shall be done by the respective departments of the Institution by themselves or in collaboration with industry/such other institutions deemed to have specialized expertise in the proposed area of training.
e) If the duration of the course is less than or equal to 40 hours, it can be completed in one semester, otherwise, it can suitably distributed over a number of semesters.
f) Mere enrolment/registration for the program shall not entitle any claim for award of certificate.
g) A candidate shall be deemed eligible for the award of the certificate if he/she
   - Attends at least 75% of scheduled training sessions
   - Complies to all the requirements of submission of the assignments, presentations, seminars, projects, etc., and also appears for periodic tests.
   - Shall attain minimum levels of performance in tests as prescribed.
   - Shall remit such fee as deemed fit for the certification
   - A candidate registered and failed to meet the requirements shall be permitted to repeat the said training one another time after remitting 25% of the fee fixed for the program as re-registration fee.

If the student is absent for the periodic tests, the test shall be re-conducted on payment of 10% of fee.

5. COURSES OFFERED:

Name of the Program	Degree
UG Programs (Engineering & Technology)	B.Tech. (Civil) B.Tech. (EEE) B.Tech. (Mech.) B.Tech. (ECE) B.Tech. (CSE) B.Tech. (CHEM) B.Tech. (IT)
PG Programs (Engineering & Technology)	M.Tech. (Structural Engineering) M.Tech. (Power Systems) M.Tech. (PDM) M.Tech. (VLSI) M.Tech. (CN&IS)
Other PG Programs	MBA
Research Programs	Ph.D. in Civil, EEE, MECH, ECE, CSE, CHEM, MBA and MATHS

6. DISTRIBUTION AND WEIGHTAGE OF MARKS:

B.Tech.:

a). All Theory courses will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment:

Subjective tests	- 20 Marks
Objective tests	- 10 Marks
Assignments	- 10 Marks

- Two subjective tests shall be conducted.
- Each subjective test shall be conducted for 90 Minutes and have 3 questions each for 7 marks (No choice) and the same shall be scaled down to 20 Marks.
- Average of two subjective tests shall be considered.
- Two objective tests (online) shall be conducted each for 20 marks.
- Each objective test shall be conducted for 20 minutes and have 20 Multiple Choice Questions each for 1 mark and the same shall be scaled down to 10 Marks.
- Average of two objective tests shall be considered.
- Assignments shall be assessed for 10 marks.

External Assessment:

- External examination is for 60 marks (180 min). Question paper contains 10 questions (2 questions from each unit) and each question carries 12 marks. Student shall answer 5 questions (1 question from each unit).

b). **Laboratory/Practice:**

All Laboratory/Practice courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

- Continuous assessment for 15 marks for each experimental session finally averaged to 15 marks.
- Project based learning shall be assessed for 15 Marks.
- In Project based learning, a student has to identify a problem such that at least 3 or 4 modular learning of experiments shall be integrated and submit comprehensive report with solution at the end of the semester.
- An internal assessment test conducted at the end of the semester shall be assessed for 10 marks.

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Both internal and external examination shall include assessment of the student on
    a) Knowledge of principles/concepts involved
    b) Experimental design
    c) Result interpretation and analysis
    d) Experimental report

c). **Drawing/Design/Estimation:**

i) Computer Aided Engineering Graphics:

Evaluation Procedure:

The course will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Question paper contains 3 questions (with internal choice). **E**ach question carries 20 marks (5 marks for free hand drawing and list of commands & 15 marks for final drawing prepared in AUTOCAD). A Student shall answer all questions.

ii) Modeling and Assembly of Mechanical Elements:

Evaluation Procedure:

The course will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Semester End Examination shall include assessment of the student on Final drawings like modeling, assembly and drafting.
- Student is expected to execute one exercise.
- Final drawings like modeling, assembly and drafting hard copies shall be evaluated by both internal and external examiners

Integrated Course (Theory + Lab):

Theory and Lab shall be assessed for 200 Marks (Each 100 marks)

- For Integrated course, the theory shall be assessed for 100 marks, of which 40 marks for internal assessment and 60 marks for semester end external examination.
- The Lab shall be assessed for 100 marks , of which, 40 marks for internal assessment and 60 marks for semester end external examination

Socially Relevant Project:

- A student shall identify and provide a solution to the problem relevant to society/Profession/Industry.
- A student shall engage at least 15 hours on socially relevant project. Socially relevant project shall be evaluated internally for 50 marks by Project Review Committee (PRC). PRC comprising of HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide shall review the progress.

Mini Project:

- A student shall undergo internship for a period of 4 weeks/provide solution to the problem relevant to Industry/ Modern tool during the vacation after VI semester and submit comprehensive report.
  - Mini project shall be evaluated internally for 50 marks by Project Review Committee (PRC).
  - PRC shall prepare rubrics for assessment.

Project Evaluation:

Project is divided into 2 phases – Phase I & Phase II

- Evaluation shall comprise of internal and external assessment.
  Internal: 110 (Phase I 50 marks, Phase II 60 Marks)
  External: 90
- A project Review committee (PRC) comprising of HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide shall review the progress once in four weeks.

Project Phase I:

- Project Phase I shall be evaluated internally by PRC for 50 Marks.
- A student shall undertake project phase I during the VII semester.
- A student shall report to the guide/external supervisor and work under his supervision at least 2 hours per week.
- Assessment shall be on
  - Literature review
  - Identification and statement of the Problem

Project Phase II:

- A student shall undertake project phase II during the VIII semester.
- A student shall report to the guide/external supervisor and work under his supervision at least 8 hours per week.
- Internal evaluation shall be done by HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide for 60 marks.
- External evaluation shall be done by HoD, Guide/Internal Examiner and External Examiner for 90 marks.
- Assessment shall be on
  a) Review on fundamental knowledge involved
  b) Inter disciplinary aspect
  c) Experimental/methodology design
  d) Result analysis and interpretations
  e) Report writing
  f) Team work
  g) Presentation
  h) Viva-voce

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2^{nd}, 3^{rd} and 4^{th} years of study shall be same as applicable to regular B.Tech students.

7. ATTENDANCE REGULATIONS:

B.Tech.:

I. A student shall be eligible to appear for end semester examinations, if he or she acquires a minimum of 75% of attendance in aggregate of all the subjects (Theory & Lab.) for the semester.
II. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the college academic committee.
III. Shortage of attendance below 65% in aggregate of all the subjects (Theory & Lab) for the semester shall not be Condoned.
IV. Detained student shall seek re- admission for that semester when offered within 4 weeks from the date of commencement of class work.

PROMOTION RULE (Based on attendance):

- A Student shall be promoted to the next semester on fulfillment of minimum attendance requirement (75%) of current semester.

PROMOTION RULE (Based on credits):

- A student shall be promoted from IV semester to V semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to IV semester from the following examinations irrespective of whether the candidate takes the examination or not.
    - Two regular and Two supplementary examinations of I semester
    - Two regular and One supplementary examinations of II semester
    - One regular examination and One supplementary examination of III semester
    - One regular examination of IV semester.

- A student shall be promoted from VI semester to VII semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to IV semester from the following examinations irrespective of whether the candidate takes the examination or not.
    - Three regular and Three supplementary examinations of I semester
    - Three regular and Two supplementary examinations of II semester
    - Two regular and Two supplementary examinations of III semester
    - Two regular and One supplementary examinations of IV semester
    - One regular and One supplementary examination of V semester
    - One regular examination of VI semester.

B.TECH (Lateral Entry):

PROMOTION RULE (Based on attendance):

A Student shall be promoted to the next semester on fulfillment of minimum attendance requirement of current semester.

PROMOTION RULE (Based on credits):

A student shall be promoted from VI semester to VII semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to VI semester from the following examinations irrespective of whether the candidate takes the examination or not.

- Two regular and Two supplementary examinations of III semester
- Two regular and one supplementary examinations of IV semester
- One regular and One supplementary examinations of V semester
- One regular examination of VI semester.

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2nd, 3rd and 4th years of study shall be same as applicable to regular B.Tech students.

8. MINIMUM ACADEMIC REQUIREMENTS:

B.Tech.: (Theory/Lab)

i. A student is deemed to have satisfied the minimum academic requirements for a course on securing at least 24 marks out of 60 marks at semester end examination and overall minimum of 40 marks out of 100 marks including internal assessment.

ii. **Integrated Course (Theory + Lab):**

- The student shall secure minimum 24 marks out of 60 marks at semester end examination and overall 40 marks out of 100 marks for Theory and Laboratory courses independently. In case of failure in either theory or Laboratory course, the student should re-appear for both theory and laboratory.
- The assessment shall be done independently for both theory and laboratory courses and final marks shall be calculated on weighted average method for converting marks into grade points.

  Sample calculation:

  Integrated course-5 credits. Theory is for 3 credits and laboratory is for 2 credits.

  Total Marks obtained in theory: 70 out of 100 (3 Credits)

  Total Marks obtained in Lab : 90 out of 100 (2 Credits)

  Final marks of the integrated course is

  (70X3 + 90X2) / 5 = 78 Marks

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2nd, 3rd and 4th years of study shall be same as applicable to regular B.Tech students.

9. GRADING SYSTEM:

B.Tech. / B.Tech. (Lateral Entry)

Semester Grade Point Average (SGPA) for the current semester which is calculated on the basis of grade points obtained in all courses, except audit courses and courses in which satisfactory or course continuation has been awarded,

SGPA= Σ (course credits earned x Grade points) /
Σ (Total course credits in the semester.

CGPA= Σ (course credits earned x Grade points) up to successfully completed semesters / Σ (Total course credits up to successfully completed.

The UGC recommends a 10-point grading system with the following letter grades as

given below:

O	(Outstanding)	10
A+	(Excellent)	9
A	(Very Good)	8
B+	(Good)	7
B	(Above Average)	6
C	(Average)	5
P	(Pass)	4
F	(Fail)	0
Ab	(Absent)	0

- iii. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X10 = 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			**139**

Thus, **SGPA** =139/20 = 6.95

Illustration for CGPA

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
Credits: 16	Credits: 18	Credits: 25	Credits: 21	Credits: 23	Credits: 22
SGPA: 7.9	SGPA: 7.8	SGPA: 7.6	SGPA: 8.0	SGPA: 8.3	SGPA: 8.6

Semester 7	Semester 8
Credits: 21	Credits:14
SGPA: 8.2	SGPA: 8.5

Thus,

CGPA= $\frac{16x7.9 + 18x7.8 + 25x7.6 + 21x8.0 + 23x8.3 + 22x8.6 + 21x8.2 + 14x8.5}{160}$ = **8.1**

10. ELIGIBILITY FOR AWARD OF DEGREE:

B.Tech:

A student shall be eligible for award of the degree if he/she fulfills the following conditions:

1) Successfully completes all the courses prescribed for the Program.
2) CGPA greater than or equal to 4.5(Minimum requirement for Pass),

11. AWARD OF CLASS:

B.Tech:

Eligible Candidates for the award of B.Tech., Degree shall be placed in one of the following Classes based on CGPA.

Class	CGPA
Distinction	≥ 7.5
First Class	≥ 6.5
Second Class	≥ 5.5
Pass class	≥ 4.5

12. INSTRUCTION DAYS:

A semester shall have a minimum of 90 clear instruction days (including internal examinations).

13. Transfers from other Institutions shall not be permitted.

14. SUPPLEMENTARY EXAMINATIONS:

Supplementary examinations shall be conducted within 4 weeks from the date of announcement of results of regular examinations.

15. WITHHOLDING OF RESULTS: The result of a student shall be withheld

- If the student has not paid the dues, if any, to the institution
- If any case of pending disciplinary action ,
- Involvement in any sort of malpractices etc.
- Involvement in ragging.

16. TRANSITORY REGULATIONS:

A Candidate shall be readmitted from University regulations to A1 regulations or from A1 regulations to A2 regulations as per the guide lines of JNTUK.

17. AMENDMENTS TO REGULATIONS:

The Academic Council of MVGR College of Engineering (Autonomous) reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations, and/ or Syllabi or any other such matter relating to the requirements of the program which are compatible to the contemporary/emerging trends effectively meeting the needs of society/industry/stake holding groups.

18. Regulations for MALPRACTICES during the conduct of examinations

	Nature of Malpractices/Improper conduct	Punishment
1 (a)	If the candidate possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only. *
(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. *

2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled. *
3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider/candidate not on rolls, he will be handed over to the police and a case is registered against him. *
4	If the candidate mishandles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. Also if the answer script is mutilated / damaged disturbing the shape, of the script, answers, the bar code intentionally.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. He shall be debarred from class work and all examinations and be allowed to reregistered for the next subsequent odd or even semester only. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.*

5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	The same should be brought to the notice of CE who in turn in consultation with malpractice committee makes decision for cancellation of the performance in that subject. *
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. *
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. *
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. *

9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. *
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. *
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.*

*

19. General :

- Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
- The academic regulation should be read as a whole for the purpose of any interpretation.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

* * *

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

- Ragging within or outside any educational institution is prohibited.
- Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	 2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	 10 Months	+	Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE MVGR A RAGGING FREE CAMPUS

Ragging

ABSOLUTELY NO TO RAGGING

1. **Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.**
2. **Ragging entails heavy fines and/or imprisonment.**
3. **Ragging invokes suspension and dismissal from the College.**
4. **Outsiders are prohibited from entering the College and Hostel without permission.**
5. **Girl students must be in their hostel rooms by 7.00 p.m.**
6. **All the students must carry their Identity Cards and show them when demanded**
7. **The Principal and the Wardens may visit the Hostels and inspect the rooms any time.**

PROGRAM STRUCTURE
B.TECH (ELECTRONICS & COMMUNICATION ENGINEERING)

Semester I

S. No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2MAT101	Mathematics-I	3	--	--	3
2	A2PYI102	Applied Physics (Theory + Lab)	3	--	3	5
3	A2CII201	Programming for Problem Solving (Theory + Lab)	3	--	3	5
4	A2MED201	Computer Aided Engineering Graphics	1	--	4	3
5	A2EHA701	Constitution of India	2	--	--	0
					Total credits	**16**

Semester II

S. No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2MAT102	Mathematics-II	3	--	--	3
2	A2CYI101	Engineering Chemistry (Theory + Lab)	3	--	3	5
3	A2EEI201	Basic Electrical Engineering (Theory + Lab)	3	--	3	5
4	A2ECW201	Electronics Workshop	--	--	3	2
5	A2EHL001	English-I	1	--	3	3
					Total credits	**18**

Semester III

S. No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2MAT107	Mathematics-III	3	--	--	3
2	A2EHT101	Biology for Engineers	3	--	--	3
3	A2ECI301	Electronic Devices & Circuits (Theory + Lab)	3	--	2	4
4	A2ECT301	Network Theory	3	--	--	3
5	A2ECT201	Internet of Things (IOT)	3	--	--	3
6	A2ECT302	Switching Theory & Logic Design	3	--	--	3
7	A2ECI201	AI Tools, Techniques & Applications	3	--	3	5
8	A2CHA701	Environmental Science	2	--	--	0
					Total credits	**24**

Semester IV

S. No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2MAT109	Mathematics-IV	3	--	--	3
2	A2EHL002	English-II (Technical English)	2	--	2	3
3	A2ECT303	Signal and Systems	3	--	--	3
4	A2ECI302	Analog Communications (Theory + Lab)	3	--	2	4
5	A2ECT304	Random Variable Stochastic Process	3	--	--	3
6	A2ECT305	Analog Circuits	3	--	--	3
7	A2ECT202	Design Thinking and Product Innovation	3	--	--	3
8	A2EHA702	Indian Traditional Knowledge	2	--	--	0
					Total credits	**22**

Semester V

S. No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2ECI303	Electromagnetic Waves & Transmission Lines (Theory +Lab)	3	--	3	4.5
2	A2ECT306	Control Systems	3	--	--	3
3	A2ECI304	Digital Communication (Theory + Lab)	3	--	3	4.5
4	A2ECT4XX	Professional Elective – 1	3	--	--	3
5	A2XXT5XX	Open Elective-I	3	--	--	3
6	A2XXT5XX	Open Elective-II	3	--	--	3
7	A2ECP601	Socially Relevant Project	-	-	2	1
					Total credits	**22**

Semester VI

S. No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2ECT307	Antennas & Wave Propagation	3	--	--	3
2	A2ECI305	Digital Signal Processing (Theory + Lab)	3	--	3	4.5
3	A2ECI306	Microprocessors & Microcontrollers (Theory + Lab)	3	--	3	4.5
4	A2ECT4XX	Professional Elective-II	3	--	--	3
5	A2ECT4XX	Professional Elective -III	3	--	--	3
6	A2MST001	Managerial Economics & Financial Analysis	3	--	--	3
7	A2ECP602	Mini Project	-	-	4	2
					Total credits	**23**

Semester VII

S. No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2ECI307	Microwave Engineering (Theory + Lab)	3	--	2	4
2	A2ECI307	Virtual Instrumentation	3	--	--	3
3	A2ECT4XX	Professional Elective-IV	3	--	--	3
4	A2ECT4XX	Professional Elective-V	3	--	--	3
5	A2ECT4XX	Professional Elective-VI	3	--	--	3
6	A2EHT001	Professional Ethics and Human Values	3	--	--	3
7	A2ECP603	Project Phase - I	-	-	4	2
					Total credits	**21**

Semester VIII

S. No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2XXT5XX	Open Elective-III (MOOCS)	3	--	--	3
2	A2XXT5XX	Open Elective-IV (MOOCS)	3	--	--	3
3	A2ECP604	Project Phase - II	--	--	16	8
					Total credits	**14**

Professional Elective-I :

S.No.	Course Code	Course Title
1	A2ECT401	Information Theory and Coding
2	A2ECT402	VLSI Design
3	A2ECT403	Python Programming

Professional Elective-II :

S.No.	Course Code	Course Title
1	A2ECT404	Optical Communication
2	A2ECT405	Digital IC Design
3	A2ECT406	Soft Computing Techniques

Professional Elective-III

S.No.	Course Code	Course Title
1	A2ECT407	EMI/EMC
2	A2ECT408	Computer Architecture & Computer Networks
3	A2ECT409	Transform Techniques

Professional Elective-IV :

S.No.	Course Code	Course Title
1	A2ECT410	Cellular & Mobile Communication
2	A2ECT411	Analog IC Design
3	A2ECT412	Digital Image & Video Processing

Professional Elective-V :

S.No.	Course Code	Course Title
1	A2ECT413	Radar & Satellite Systems
2	A2ECT414	Embedded & Realtime Operating Systems
3	A2ECT415	Biomedical Signal processing

Professional Elective-VI :

S.No.	Course Code	Course Title
1	A2ECT416	Display Systems
2	A2ECT417	System On Chip
3	A2ECT418	Speech and Audio Processing

Open Elective Courses (Offered for other departments):

Open Elective-I:

S.No.	Course Code	Course Title
1	A2ECT501	Principles of Communication Engineering
2	A2ECT502	Microcontrollers and Applications
3	A2ECT503	Electronic Instrumentation

Open Elective-II:

S.No.	Course Code	Course Title
1	A2ECT504	Biomedical Engineering
2	A2ECT505	Transducers and Sensors
3	A1ECT506	Basics of VLSI Design

Audit Courses

S.No.	Course Code	Course Title
1	A2EHT701	Constitution of India
2	A2EHT702	Indian Traditional Knowledge
3	A2CHT701	Environmental Science

A2MAT101	SEMESTER - I	L	T	P	C
	MATHEMATICS-I (common to ALL branches)	3	0	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: LINEAR ALGEBRA-1

Rank of a matrix: Elementary row and column transformations, equivalent matrices, Echelon form of a matrix, calculation of rank by reducing the matrix to Echelon form. System of equations: Linear system of equations, homogeneous and non-homogeneous system of equations, consistency criteria, trivial and non-trivial solutions, solving system of equations by Rank method; Eigenvalues and Eigenvectors: Finding Eigenvalues and Eigenvectors, properties of Eigenvalues and Eigenvectors (statements) including spectral mapping theorem.

UNIT- II: LINEAR ALGEBRA-2

Cayley-Hamilton Theorem: Statement of the theorem and its verification. Applications: Finding higher powers of a matrix, finding matrix polynomials, finding inverse of matrix. Diagonal form of a matrix: Reduction to diagonal form, spectral and modal matrices, finding higher powers of a matrix using diagonalisation, Quadratic forms: Matrix form of quadratic forms, orthogonal transformation, canonical form, reduction of quadratic form to canonical form by orthogonal transformation method, rank, index, signature and nature (definiteness) of a quadratic form.

UNIT-III: FIRST ORDER DIFFERENTIAL EQUATIONS & APPLICATIONS

Outlines: Differential Equations(DEs), Order and degree of a DE, Formation of DEs, general solutions of a DE; Solving first order and first degree DEs: linear DEs, Bernoulli's DEs (reducible to linear), exact DEs, integrating factors, non-exact DEs (reducible to exact).

Applications to real world problems: Newton's law of cooling, laws of growth and decay, family of curves, orthogonality of families curves, orthogonal trajectories (Cartesian and polar curves).

UNIT-IV: HIGHER ORDER DIFFERENTIAL EQUATIONS

Differential equations of higher order: Linear differential equations of higher order, its operator form. Solution concepts: General (complete) solution, particular solution. Solution of linear differential equations of higher order: Auxiliary equations, rules for finding complementary functions, rules for finding particular integrals (general and special methods).

UNIT-V: LAPLACE TRANSFORMS

Laplace transformation: Laplace transformation of elementary functions, Properties: Linearity, change of scale, first shifting properties, finding Laplace transformations using properties, Advanced properties: Laplace transformations of derivatives and integrals, multiplication by t^n, division by t (statements), finding Laplace transformations

using advanced properties; Inverse Laplace transformations: Finding inverse Laplace transformations using partial fractions, statement of Convolution theorem, finding inverse Laplace transformations by Convolution theorem; Applications: Solving Initial Value Problems by using Laplace transformations.

//Topics prefixed with 'outlines / overview' are not for assessment//

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017
2. T.K.V. Iyengar et al, Engineering Mathematics, S. Chand Publishers, Revised edition

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010
3. T. Veerarajan, Higher Engineering Mathematics, Tata McGraw-Hill, 2008

COURSE OUTCOMES: Learners at the end of this course will be able to

CO 1	KO#1	Recall the concepts of Linear algebra
CO 2	KO#2	Recall the solution methods and applicability of first order differential equations
CO 3	KO#3	Recall the solution methods of higher order differential equations and the concepts of Laplace transforms
CO 4	UO#1	Use and interpret the concepts of linear algebra
CO 5	UO#2	Use and interpret solution methods and applicability of first order differential equations
CO 6	UO#3	Use and interpret solution methods of higher order differential equations and the concepts of Laplace transforms
CO 7	AO#1	Apply the concepts of linear algebra, differential equations and Laplace transformation to model and solve real world problems

CO/PO Mapping

Course Title:				Mathematics-I (Common to ALL Branches)										
Course Code:				A2MAT101										
Course Designed by				Dept. of Mathematics										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2							2			
CO2	3	3		2							2			
CO3	3	3		2							2			
CO4	3	3		2							2			
CO5	3	3		2							2			
CO6	3	3		2							2			
CO7	3	3		2							2			

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 06.07.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PYI102	SEMESTER – I	L	T	P	C
	APPLIED PHYSICS (COMMON TO EEE,ECE, CSE & IT)	3	-	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: WAVE OPTICS [10hrs]

Interference: Introduction- Coherence– Young's double slit experiment- Theory of interference fringes- Interference in thin parallel film by reflection (under reflected light)- Newton's Rings- Applications.

Diffraction: Introduction **-** Fraunhofer diffraction at- Single slit– Double slit (qualitative)- Diffraction Grating.

Polarization: Introduction– Polarization by refection- Brewsters law- Double refraction– Nicol Prism– Theory of Plane, circular and elliptically polarized light – Quarter wave & Half wave plate

UNIT-II: MAGNETIC PROPERTIES OF MATERIALS [8hrs]

Introduction– Origin of Magnetic moment in atom– Classification of magnetic materials– Ferromagnetism- Weiss theory (qualitative)- Domain theory- Hysteresis- Soft & Hard magnetic materials- Ferrites- Garnets- Applications.

UNIT-III: DIELECTRIC PROPERTIES OF MATERIALS [8hrs]

Introduction– Types of Polarization- Electronic- Ionic- Orientation polarization– Internal field- Clausius Mossoiti relation- Frequency dependency of polarization- Dielectric loss- Loss Tangent- Ferro electricity- Piezoelectricity- P-E loop- Applications.

Unit-IV: HEAT TRANSFER [10hrs]

Transfer of heat energy- conduction, convection and radiation and their fundamental laws. Thermal expansion of solids and liquids - expansion joints -bimetallic strips. Heat conductions in solids- thermal conductivity - Forbe's and Lee's disc method: theory and experiment - applications (qualitative). Working principles of heat exchangers- refrigerators- ovens- solar water heaters.

UNIT–V: QUANTUM PHYSICS & SEMICONDUCTORS [12hrs]

Quantum Physics: Introduction- Matter wave– Davisson Germer Experiment- Schrodinger's wave equations– Wave function– Particle in potential box– Origin of energy bands.

Introduction- Intrinsic semiconductors– Carrier concentration (qualitative)– Electrical conductivity- Extrinsic semiconductors– Carrier concentration (qualitative)- Drift and Diffusion currents- Direct and Indirect band gap semiconductors- Light emitting diode– Solar cell- Hall effect- Applications.

TEXTBOOKS:

1. R.K.GAUR and S.L.GUPTA, Engineering Physics, Dhanpat Rai Publications

REFERENCES:

1. RESNICK, HALLIDAY and WALKER, Principles of Physics, Wiley Publishers
2. P.K. NAG, Heat and Mass Transfer, Mc Graw Hill Publishers.
3. B.K. PANDEY and S. CHATURVEDI, Engineering Physics, Cengage Learning Publishers.

COURSE OUTCOMES:

CO1. Student will be able to gain knowledge on basics of interference, diffraction and polarization of light.

CO2. Student will be able to gain knowledge on fundamentals of magnetic properties of materials and the polarization mechanisms of dielectrics.

CO3. Student will be able to gain knowledge on modes of heat transfer and the essentials of quantum physics & semiconductors for engineers.

CO4. The students will be able to understand and recognize the principle behind working of optical devices.

CO5. The students will be able to understand and recognize the underlying property behind working of electric and magnetic components in devices.

CO6. The students will be able to understand and recognize the importance of heat transfer and quantum mechanics based semiconductor devices.

CO7. The students will have the ability to apply the conceptual knowledge of principles of quantum physics in designing and developing engineering applications.

CO/PO MAPPING:

Course Title:	Applied Physics (Common to ECE, CSE & IT Branches)													
Course Code:	A2PYI102													
Course Designed by	Dept. of Physics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3						1				1		
CO2	3	3						1				1		
CO3	3	3						1				1		
CO4	3	3						1				1		
CO5	3	3						1				1		
CO6	3	3						1				1		
CO7	3	3						1				1		

Course designed by	DEPARTMENT OF PHYSICS
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PYI102	SEMESTER – I	L	T	P	C
	APPLIED PHYSICS LAB (COMMON TO EEE,ECE, CSE & IT)	-	-	3	2
	Total Contact Hours – 42				

LIST OF EXPERIMENTS

1.	Determination of the radius of curvature of the plano-convex lens by Newton's Rings method.
2.	Determination of the thickness of the thin object (hair/paper) by Wedge method.
3.	Determination of the prominent spectral line wavelengths in mercury spectrum by normal incidence method.
4.	Obtain the signature variation of the axial magnetic field for a circular coil carrying current.
5.	Estimation of the hysteresis loss for a ferromagnetic material.
6.	Determination of thermal conductivity coefficient of the disc shaped material.
7.	Determination of energy band gap of the semiconductor by using junction diode.
8.	To plot I/V Characteristics of Zener diode.
9.	Determination of temperature coefficient of the thermistor.
10.	To plot frequency response characteristics of the L.C.R series circuit.

TEXTBOOKS:

1. BALASUBRAMANIAN.S, SRINIVASAN.M..N, A Text book of Practical Physics, S Chand Publishers, 2017

REFERENCES:

1. https://vlab.amrita.edu.

COURSE OUTCOMES:

CO1. Design experiments to demonstrate and investigate the interference and diffraction patterns of light.

CO2. Design experiments for signature variation of magnetic field due to current and the hysteresis loss in magnetic materials.

CO3. Design experiment to determine the thermal conductivity coefficient (K) of a material.

CO4. Design L.C.R series circuits for desired applications based on their frequency response characteristics.

CO5. Design experiments for determining the physiognomies of the semiconductor devices like the energy band gap, breakdown voltage and coefficient of resistance.

CO/PO MAPPING:

Course Title:	Applied Physics Lab (Common to ECE, CSE & IT Branches)													
Course Code:	A2PYI102													
Course Designed by	Dept. of Physics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3						1	2	1		1		
CO2	3	3						1	2	1		1		
CO3	3	3						1	2	1		1		
CO4	3	3						1	2	1		1		
CO5	3	3						1	2	1		1		

Course designed by	DEPARTMENT OF PHYSICS
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CIT201	SEMESTER – I	L	T	P	C
	PROGRAMMING FOR PROBLEM SOLVING	3	0	0	3
	Total Contact Hours : 54				
	Prerequisites: Mathematics				

COURSE OBJECTIVES

COBJ1.	Students will study systematic approach to problem solution specification using finite number of unambiguous steps.
COBJ2.	Students will gain understanding of procedural language features using C as the template.
COBJ3.	Students will read and analyse alternative construct choices in procedural language C.
COBJ4.	Students will get exposure to systematic approach of automated solution design, implementation and testing using a procedural language.

SYLLABUS

UNIT – I: [9 HOURS]

INTRODUCTION: Introduction to Programming, Computer System, Hardware and Software concepts.

PROBLEM SOLVING: Algorithm, Pseudo-code, flow-chart, program development steps, high-level, Assembly and machine languages.

BASICS OF C PROGRAMMING: Structure of C program, identifier, basic data types and sizes, constants, variables, arithmetic operators, relational operators, logical operators, increment and decrement operators, assignment operator, conditional operator, scanf and printf built-in functions, Creating and running programs.

UNIT – II: [9 HOURS]

BIT-WISE OPERATORS: logical, shift, rotation, masks.

EXPRESSIONS: expressions, type conversions, conditional expressions, precedence and order of evaluation.

SELECTION: Two-way selection: if-else, nested if, examples, multi-way selection: switch, else-if, examples.

ITERATIVE: loops - while, do-while and for statements, break continue, event and counter controlled loops.

UNIT – III: [18 HOURS]

Part – I: [9 HOURS]

ARRAYS: Arrays (1-D, 2-D), Character arrays and Strings, Searching (Linear Search and Binary Search).

Part – II: [9 HOURS]

BASIC ALGORITHMS: Basic Sorting Algorithms (Bubble, Insertion and Selection), comparing algorithms for complexity.

FUNCTIONS: Functions, Scope and Extent of Variables, Function Parameters, parameter passing using call-by-value, sub-routines, Storage Classes,#define,#ifdef, #ifndef pre-processor directives.

UNIT – IV: [9 HOURS]

RECURSION: Definition of Recursion, example programs using recursion like finding Factorial, Fibonacci series, Quick sort, puzzle solving using recursive functions (towers of hanoi, ackerman function).

POINTERS: Definition of Pointers, Pointer Type, Pointer Arithmetic, Function parameter passing using call-by-reference.

MEMORY ALLOCATION: Difference between static and dynamic memory allocation, dynamic memory allocation using built-in functions, dangling pointer, unreferenced memory problem.

UNIT – V: [9 HOURS]

ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, bit-fields, concept of linked list, program applications.

FILE-HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, command line arguments.

Suggested Text Books

1. Programming For Problem Solving, Behrouz A.Forouzan & Richard F.Gilberg, Cengage Publishers, 3rd Edition
2. Programming In C:A Practical Approach, Ajay Mittal, Pearson Education

Suggested Reference Books

1. Brian W. Kernighan And Dennis M. Ritchie, The C Programming Language, Prentice Hall Of India

2. Introduction To C Programming, Reema Thareja, Oxford University Press

3. E. Balaguruswamy, Programming In Ansi C, Tata Mcgraw-Hill

COURSE OUTCOMES

The student will

1. Have the ability to **describe** a formal algorithmic solution for the given problem, **list** the features of C including scalar & vector data types, operators, **Outline** expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.

2. Have the ability to **describe** one and two-dimensional arrays, **outline** loops and arrays for searching and **describe** various sorting techniques.

3. Have the ability to **outline** the purpose of functions, pointers, command line arguments, dynamic memory allocation. **Define** storage classes. **Describe** command like arguments, structures, unions, and enumeration. Have knowledge of handling files.

4. Have the ability to **solve** complex expressions, **design** algorithms and **develop** programs in C language using the basic constructs, data types, operators, control & iterative statements, and arrays.

5. Have the ability to **apply** arrays to solve complex matrix related problems and strings. **Compare and contrast** various searching and sorting techniques for complexity.
6. Have the ability to **distinguish between** function call types. **Draw inferences on** command line arguments, storage classes, and pre-processor directives. **Use** pointers with functions, arrays, strings, to **solve** complex problems. **Give example** and **solve** classical recursion problems**. Compare and contrast** static and dynamic memory allocation, and **apply** them. **Use** structures and unions to implement and **solve** real-time problems. **Apply** file related functions to process files.

7. Have the ability to **Fully appreciate** the art of procedural programming in C and develop programs **optimally** using the full feature set of C language.

Course Title:	Programming for problem solving (Common to ALL Branches)														
Course Code:	A2CIT201														
Course Designed by	Dept. of Computer Science and Engineering														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSOM	PSON	PSOO
CO1	3	3						3	2	1		2	1	1	1
CO2	3	3						3	2	1		2	1	1	1
CO3	3	3						3	2	1		2	1	1	1
CO4	3	3	3	3	3	3	3	3	2	1	1	2	3	3	3
CO5	3	3	3	3	3	3	3	3	2	1	1	2	3	3	3
CO6	3	3	3	3	3	3	3	3	3	1	1	2	3	3	3
CO7	3	3	3	3	3	3	3	3	3	1	1	3	3	3	3

Levels of Correlation: High-3, Medium-2, Low-1

PROGRAMMING FOR PROBLEM SOLVING PRACTICE

COURSE OBJECTIVES	
1.	To use basic data types, operators, expressions and expression evaluation mechanisms using C Programming Language.
2.	To implement control flows construct in C Programming Language and understand the syntax, semantics and usability contexts of these different construct.
3.	To develop composite data types in C and constructs available to develop their data-types, utilize them to model things and dealing with data from and to external files.
4.	To design programs with different variations of the constructs available for practicing modular programming and understand the pros and cons of using different variants and apply optimization.

UNIT – I

WEEK 1:

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using computers
Lab1: Familiarization with programming environment

i) Exposure to Turbo C, gcc, Code Blocks IDE
ii) Writing simple programs using printf(), scanf()

WEEK 2:

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments/Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts
Lab1: Converting algorithms/flowcharts into C Source code

Developing the algorithms/flowcharts for the following sample programs

i. Sum and average of 3 numbers
ii. Conversion of Fahrenheit to Celsius and vice versa
iii. Simple interest calculation

WEEK 3:

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:
Lab 3: Simple computational problems using arithmetic expressions

i) Finding the square root of a given number
ii) Finding compound interest
iii) Area of a triangle using heron's formulae
iv) Distance travelled by an object

UNIT – II

WEEK 4:

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and their precedence and associativity:
Lab 4: Simple computational problems using the operator's precedence and associativity

i) Evaluate the following expressions
   a. A+B*C+(D*E)+F*G
   b. A/B*C-B+A*D/3
ii) a. A+++B---A
   b. J=(i++)+(++i)
iii) Find the maximum of three numbers using conditional operator
iv) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5:

Objective: Explore the full scope of different variants of "if construct" namely if-else, null-else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures

i) Write a C program to find the max and min of four numbers using if-else
ii) Write a C program to generate electricity bill
iii) Find the roots of the quadratic equation
iv) Write a C program to simulate a calculator using switch case
v) Write a C program to find the given year is a leap year or not

WEEK 6:

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops:
Lab 6: Iterative problems e.g., the sum of series

i) Find the factorial of given number using any loop
ii) Find the given number is a prime or not
iii) Compute sine and cos series
iv) Checking a number palindrome
v) Construct a pyramid of numbers

UNIT – III

WEEK 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1D Arrays: searching
Lab 7: 1D Array manipulation, linear search

i) Find the min and max of a 1-D integer array
ii) Perform linear search on1D array
iii) The reverse of a 1D integer array
iv) Find 2's complement of the given binary number
v) Eliminate duplicate elements in an array

WEEK 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2D arrays, Sorting and Strings
Lab 8: Matrix problems, String operations, Bubble sort

i) Addition of two matrices
ii) Multiplication two matrices
iii) Sort array elements using bubble sort
iv) Concatenate two strings without built-in functions
v) Reverse a string using built-in and without built-in string functions

UNIT-IV

WEEK 9:

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 9: Functions, call by value, scope and extent,
Lab 9: Simple functions using call by value, Solving differential equations using Eulers theorem

i) Write a C function to calculate NCR value
ii) Write a C function to find the length of a string
iii) Write a C function to transpose of a matrix
iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 10:

Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 10: Recursion, the structure of recursive calls

Lab 10: Recursive functions

i) Write a recursive function to generate Fibonacci series
ii) Write a recursive function to find the lcm of two numbers
iii) Write a recursive function to find the factorial of a number
iv) Write a C Program to implement Ackermann function using recursion
v) Write a recursive function to find the sum of series.

WEEK 11:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 11: Call by reference, dangling pointers
Lab 11: Simple functions using Call by reference, Dangling pointers

i) Write a C program to swap two numbers using call by reference
ii) Demonstrate Dangling pointer problem using a C program
iii) Write a C program to copy one string into another using pointer
iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

UNIT – V

WEEK 12:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc(), calloc(), realloc() and free() functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 12: Pointers, structures and dynamic memory allocation
Lab 12: Pointers and structures, memory dereference

i) Write a C program to find the sum of a 1D array using malloc()
ii) Write a C program to find the total, average of n students using structures
iii) Enter n students data using calloc() and display failed students list
iv) Read student name and marks from the command line and display the student details along with the total.
v) Write a C program to implement realloc()

WEEK 13:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly-linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 12: Bitfields**,** Self-Referential Structures, Linked lists
Lab 12: Bitfields, linked lists

i) Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit-fields
ii) Create and display a singly linked list using self-referential structure
iii) Demonstrate the differences between structures and unions using a C program
iv) Write a C program to shift/rotate using bitfields
v) Write a C program to copy one structure variable to another structure of the same type.

WEEK 14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling:
Lab 14: File operations

i) Write a C program to write and read text into a file
ii) Write a C program to write and read text into a binary file using fread() and fwrite()
iii) Copy the contents of one file to another file
iv) Write a C program to merge two files into the third file using command-line arguments
v) Find no. of lines, words and characters in a file
vi) Write a C program to print last n characters of a given file.

TEXTBOOKS:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

REFERENCES:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India
2. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

COURSE OUTCOMES

CO1.	**Demonstrate** the ability to write a formal algorithmic solution for the given problem, **name & explain** the features of C like types including scalar & vector types, operators, expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.
CO2.	**Implement** one and two-dimensional arrays to solve simple mathematical and matrix related problems. **Make use of** loops and arrays for searching and **Compare** various sorting techniques.
CO3.	**Identify** the purpose of functions, pointers, command line arguments, dynamic memory allocation. **Define** storage classes. **Understand** command like arguments, structures and unions. Have **knowledge** of handling files.
CO4.	**Design** algorithms and **develop** programs in C language using the basic constructs, data types, operators, control statements, and arrays.
CO5	**Apply** pointers, functions, derived data types, and dynamic memory allocation, **design** solutions to challenging problems.
CO6	**Illustrate** the art of procedural programming in C and **develop** programs optimally using the full feature set of C language.

Course Title:	Programming for problem solving lab														
Course Code:	A2CII201														
Course Designed by	Dept. of CSE & IT														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2	3	1	1	1	2	2			2	2	2
CO2	3	3	1	2	3	1	1	1	2	2			2	2	2
CO3	3	3	2	3	3	2	1	1	2	2			3	3	3
CO4	3	3	2	3	3	3	1	1	2	2			3	3	3
CO5	3	3	3	3	3	3	1	1	2	2			3	3	3
CO6	3	3	3	3	3	3	1	1	3	3	3		3	3	3

Levels of Correlation: High-3, Medium-2, Low-1

Course designed by	DEPARTMENTS OF CSE & IT
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019

A2MED201	SEMESTER - I	L	T	P	C
	COMPUTER AIDED ENGINEERING GRAPHICS	1	-	3	3
	Total Contact Hours – 60				

SYLLABUS

UNIT-I

Overview of Computer Graphics:

Computer technologies that impact on graphical communication, Demonstrating knowledge of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line, The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.

Set up of the drawing page and the printer, Scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing.

Applying dimensions to objects, applying annotations to drawings;

UNIT-II

Layers: Setting up and use of Layers, layers to create drawings, create, edit and use customized layers, concept of view ports.

Introduction to Orthographic Projections: Projections of Points; Projections of Straight Lines parallel to both planes; Projections of Straight Lines-Parallel to one and inclined to other plane.

UNIT-III

Projections of Straight Lines and Planes: Lines inclined to both planes, determination of true lengths, angle of inclinations and traces, Projections of Planes

UNIT-IV

Projections and sections of solids: Projections of simple solids- Sections of solids

UNIT -V

Development of surfaces, Isometric Projection and Conversion of Isometric Views to Orthographic Views: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa

TEXT BOOKS

1. DM Kulkarni, AP Rastogi, AK Sarkar "Engineering graphics with Auto CAD" PHI Publishers
2. Bhatt N.D., Panchal V.M. & Ingle P.R "Engineering Drawing" Charotar Publishing House.

REFERENCE BOOKS

1. Shah, M.B. & Rana B.C "Engineering Drawing and Computer Graphics", Pearson Education.
2. Agrawal B. & Agrawal C. M "Engineering Graphics", TMH Publication.
3. Narayana, K.L. & P Kannaiah "Engineering Drawing", SciTech Publishers.
4. CAD Software Theory and User Manuals.

COURSE OUTCOMES

At the end of the course the students will be able to:

CO1: Prepare two dimensional drawings using draw and modify commands in Auto CAD software and represent dimensions to the drawings

CO2: Clearly differentiate different types of projections and get solutions to projections of points in Auto CAD by applying the layers concept

CO3: Solve problems related to projections of straight lines and planes

CO4: Prepare simple solids in CAD software and obtain solutions to projections and sections of solids

CO5: Develop the surfaces of simple solids, prepare Isometric drawings and convert isometric drawings into orthographic views

CO/PO Mapping

Course Title:	Computer Aided Engineering Graphics													
Course Code:	A2MED201													
Course Designed by	Dept. of Mechanical Engineering													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2		3	1		1	2	3	2	2	3	2
CO2	3	2	2		3	1		1	2	3			2	1
CO3	3	2	2		3	1		1	2	3			2	1
CO4	3	2	3		3	1		1	2	3	2	2	3	1
CO5	3	2	3		3	1		1	2	3	2	2	3	1

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

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A2EHA701	SEMESTER - I	L	T	P	C
	CONSTITUTION OF INDIA	2	-	-	0
	Total Contact Hours – 30				

SYLLABUS

UNIT – I: HISTORY OF MAKING OF THE INDIAN CONSTITUTION

History - Drafting Committee, (Composition & Working)

UNIT – II: PHILOSOPHY OF THE INDIAN CONSTITUTION: Preamble - Salient Features

UNIT-III: CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES: Fundamental Rights -Right to Equality -Right to Freedom -Right against Exploitation -Right to Freedom of Religion -Cultural and Educational Rights -Right to Constitutional Remedies ; Directive Principles of State Policy ; Fundamental Duties.

UNIT-IV: ORGANS OF GOVERNANCE: Parliament -Composition - Qualifications and Disqualifications - Powers and Functions - Executive - President - Governor - Council of Ministers; Judiciary, Appointment and Transfer of Judges, Qualifications.

UNIT – V: LOCAL ADMINISTRATION: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayati raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat : Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

TEXT BOOK:
Reference Source compilation

REFERENCES:
1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.

COURSE OUTCOMES:

CO1. Students will be able to discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.

CO2. Students will be able discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.

CO3. Students will be able to discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP]under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.

CO4. Students will be able to discuss the passage of the Hindu Code Bill of 1956.

CO5. Students will be able to discuss the powers of Executive, Judiciary and Legislature.

CO/PO Mapping

Course Title:	Constitution of India (Common to ALL Branches)													
Course Code:	A2EHA701													
Course Designed by	Dept. of English & Humanities													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2								
CO2						2								
CO3						2								
CO4						2								
CO5						2								

Course designed by	DEPARTMENT OF ENGLISH & HUMANITIES
Approval	Approved by: Meeting of Board of Studies held on 23.06.15
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

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A2MAT102	SEMESTER - II	L	T	P	C
	MATHEMATICS-II (MEC,ECE,EEE,CHE & CIV)	3	0	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: NUMERICAL METHODS-1

Solving Algebraic and Transcendental Equations: Intermediate value theorem (statement), solution concepts, error in solution, measure of accuracy, approximate and exact solutions, Solution methods: Bisection method, Regula-Falsi method and Newton-Raphson Iterative method; Finite differences: Forward, backward and shift operators, relations among operators, Interpolation: Interpolation and extrapolation, data of equal and unequal intervals, Newton's forward and backward Interpolation formulae, Lagrange's interpolation formula, Fitting polynomials to the data by using Newton's and Lagrange's formulae, Inverse Interpolation by Lagrange's formula.

UNIT- II: NUMERICAL METHODS-2

Numerical Integration: Simpson's and Trapezoidal rules, Weddle's and Boole's rules of integrations; Numerical solutions of ordinary differential equations: Concepts of Initial Value Problem, Taylor's series method, Euler's method, Runge - Kutta method of fourth order; Predictor-corrector method: Milne's method to solve initial value problems.

UNIT-III: MULTIVARIABLE CALCULUS

Overview: Functions of two variables, limit and continuity, partial derivative and its geometrical meaning; Functions of several variables: Partial differential coefficients of higher order, total derivatives, Chain rules for partial differentiation, partial differentiation of Implicit functions; Jacobians: Jacobian and properties, chain rule, functional dependence, Jacobian of implicit functions

Maxima and Minima: Maxima and minima of a function of two variables, constrained maxima and minima, Lagrange's method of undetermined multipliers.

UNIT-IV: PARTIAL DIFFERENTIAL EQUATIONS -FIRST ORDER

Formation of PDEs: Elimination of arbitrary constants, Elimination of arbitrary functions; Solution concepts of PDEs: Complete solution / integral, particular integral, general integral and singular integral, PDEs solvable by direct integration; Linear PDEs of first order (Lagrange's linear equation): Method of grouping and method of multipliers; Nonlinear PDEs of first order: Solution methods of solving PDEs in standard forms I, II, III & IV (as is specified in Text Book 1).

UNIT-V: PARTIAL DIFFERENTIAL EQUATIONS -HIGHER ORDER

Homogeneous Linear Partial Differential Equations of second and higher order with constant coefficients: Symbolic form, Rules for finding complementary function, Rules for finding particular integral, working procedure to get complete solution; Solving nonhomogeneous linear PDEs of second and higher order with constant coefficients;

Method of separation of variables: concept of boundary value problem, solving boundary value problems by separating variables.

//Topics prefixed with 'outlines / overview' are not for assessment//

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017
2. T.K.V. Iyengar et al, Engineering Mathematics, S. Chand Publishers, Revised edition

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010
3. T. Veerarajan, Higher Engineering Mathematics, Tata McGraw-Hill, 2008

COURSE OUTCOMES: At the end of course, students shall be able to

CO1	Recall the concepts of numerical methods.
CO2	Recall the concepts of multivariable calculus.
CO3	Recall solution methods of PDEs.
CO4	Use the concepts of numerical methods to solve equations, do interpolation & numerical integration and also to solve ODEs numerically.
CO5	Use the concepts of multivariable calculus to find maxima & minima of a multivariable function.
CO6	Use solution methods of PDEs to solve BVPs.
CO7	Apply the concepts of numerical methods, multivariable calculus and PDEs to solve real world problems including BVPs.

CO/PO Mapping

Course Title:	MATHEMATICS-II (MEC,ECE,EEE,CHE & CIV)													
Course Code:	A2MAT102													
Course Designed by	Dept. of Mathematics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2							2			
CO2	3	3		2							2			
CO3	3	3		2							2			
CO4	3	3		2							2			
CO5	3	3		2							2			
CO6	3	3		2							2			
CO7	3	3		2							2			

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 06.07.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CYI101	SEMESTER - II	L	T	P	C
	ENGINEERING CHEMISTRY (Common to all branches)	3	--	2	5
	Total Contact Hours – 48				

SYLLABUS

UNIT 1: WATER TECHNOLOGY

Introduction –Soft Water and hardness of water, Estimation of hardness by EDTA Method - Boiler troubles - Industrial water treatment – specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, zeolite and ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.

UNIT 2: POLYMERS

Introduction to polymers, functionality of monomers, addition and condensation polymerization, copolymerization, stereospecific polymerization with specific examples. Thermoplastics and Thermo-sets – their differences.

Elastomers – applications with specific examples- Preparation, properties and uses of PVC, Bakelite, Teflon and Nylon-6, 6, Buna-S and Thiokol rubber- Fibre reinforced plastics – carbon fibre, glass fibre and aramids.

UNIT 3: ELECTROCHEMISTRY AND APPLICATIONS

Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations.
Primary cells –dry cell- Secondary cells – lead acid, nickel-cadmium and lithium ion batteries- working of the batteries including cell reactions- Fuel cells, hydrogen-oxygen, and methanol fuel cells – working of the cells.
Corrosion: Introduction to corrosion, mechanism of dry and wet corrosion, Pilling Bedworth ratios and uses, Types of corrosion – Differential aeration corrosion, galvanic corrosion, pitting corrosion, waterline corrosion and stress corrosion, Factors affecting the rate of corrosion – metal based factors and environmental based factors, protection techniques – metal coatings – galvanization and tinning, cathodic protection, inhibitors – cathodic and anodic, organic coatings – paints – constituents and their functions.

UNIT-4: CHEMISTRY OF ADVANCED MATERIALS

NANOMATERIALS: introduction- synthesis of Nano material by sol gel method- CVD- engineering applications of Nano materials

CEMENT: Introduction to ordinary Portland cement- manufacturing of OPC- setting and hardening of cement- decay of cement.

FUELS: Introduction- classification- liquid fuels- cracking- knocking- octane number and cetane number; Lubricants- definition- mechanism and properties of lubricants

UNIT 5: INSTRUMENTAL METHODS AND APPLICATIONS

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle, instrumentation (Block diagram and working), applications of UV, IR and NMR spectroscopic methods. Chromatography- introduction- Ion exchange chromatography- applications

COURSE OUTCOMES:

CO1: The student will have the ability to describe softening methods and desalination processes. He/ She will be able to explain various types of polymers; preparation, properties and engineering applications of thermoplastic, thermosetting plastics, rubbers and FRP's.

CO2: The student will have the ability to describe electrochemical reactions, principles of batteries, fuel cell and corrosion.

CO3: The student will have the ability to outline electromagnetic spectrum and explain the working principles of IR, UV, NMR and chromatographic techniques. The student describes the synthesis, properties and applications of nanomaterials, cement. HE/ She Outlines the cracking methods, knocking of fuels.

CO4: The student will have the ability to differentiate between hard and soft water, demineralization and deionization processes and thermosetting – thermoplastic materials.

CO5: The students will have the ability to give examples on primary and secondary batteries, various types of corrosion, methods of corrosion prevention.

CO6: The student will have the ability to draw inferences on the principles and applications of various instrumental methods and also can compare and contrast between cracking methods.

CO7: The student will have the ability to analyze water samples and validate the results obtained and apply their knowledge on polymers, batteries, materials and instrumentation.

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

Reference books:

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. H.Kaur, Instrumental Methods of chemical analysis, Pragathi Prakashan, 2012.
3. Chemistry for Engineers, Teh Fu Yen, Imperial college press, London

CO/PO Mapping

Course Title:	Engineering Chemistry													
Course Code:	A2CYI101													
Course Designed by	Dept. of Chemistry													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								2			1		
CO2	3								2			1		
CO3	3								2			1		
CO4	3								2			1		
CO5	3								2			1		
CO6	3								2			1		
CO7	3								2			1		

Course designed by	DEPARTMENT OF CHEMISTRY
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

Engineering Chemistry - Laboratory

List of Experiments:

1. Determination of HCl using sodium carbonate
2. Determination of Hardness of a groundwater sample.
3. pH metric titration of strong acid vs. strong base
4. Condcutometric titration of Strong acid VS Strong base
5. Condcutometric titration of Weak acid VS strong base
6. Potentiometric titration of Fe(II) with potassium dichromate
7. Determination of Strength of an acid in Pb-Acid battery
8. Preparation of a polymer
9. Determination of viscosity of polymer solution using survismeter
10. Determination of percentage of Iron in Cement sample by colorimetry
11. Estimation of Calcium oxide in port land Cement
12. Preparation of Nanomaterials (ex: Fe/ Zn/ Ferrite)
13. Adsorption of acetic acid by charcoal
14. Determination of acid value and saponification value of a given lubricant
15. Project based learning (Mandatory for all students)

Course Outcomes:

CO1: The student will be able to determine total hardness, strength of acid in a lead acid battery, calcium in Portland cement using volumetric analysis

CO2: The student will be able to explain condcutometric, potentiometric, pH metric titrations and colorimetric determination.

CO3: The student will be able to explain the synthesis of a polymer, nanomaterials

CO/PO Mapping

Course Title:	Engineering Chemistry													
Course Code:	A2CYI101													
Course Designed by	Dept. of Chemistry													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		1			1				1	1	2		
CO2	3		1			1				1	1	1		
CO3	3		1							1	1	1		

Course designed by	DEPARTMENT OF CHEMISTRY
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2EEI201	SEMESTER – II	L	T	P	C
	Basic Electrical Engineering **(Common to all branches)**	**3**	**1**	**2**	**5**
	Total Contact Hours – 50				

SYLLABUS

UNIT 1: D.C. CIRCUITS

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, Analysis of simple circuits with DC excitation, Superposition, Thevenin's and Norton's Theorems, Time-domain analysis of first-order RL and RC circuits.

UNIT 2: A.C. CIRCUITS

Representation of sinusoidal waveforms, Average and RMS values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase AC circuits (Series & Parallel), Resonance, Three-phase balanced circuits, voltage and current relations in star and delta configurations.

UNIT 3: DC & AC MACHINES [ELEMENTARY TREATMENT ONLY]

Principle and operation of DC Generator - EMF equation – open circuit characteristic of DC shunt generator – principle and operation of DC Motor – Types of DC Motors – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of single-phase Transformer - OC and SC tests on transformer - principle and operation of single phase & Three phase Induction Motors, construction and working of synchronous motors

UNIT 4: BASICS OF POWER SYSTEMS:

Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.

UNIT 5: ELECTRICAL INSTALLATIONS

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Types of Batteries, Characteristics of Batteries. Elementary calculations for energy consumption, power factor improvement, battery backup.

TEXT BOOK/ REFERENCES:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010
2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
3. Vincent Del Toro, "Electrical Engineering Fundamentals", Pearson, 2015.

COURSE OUTCOMES:

At the end of the course, Student will be able to

CO1. To recall fundamental concepts of electrical circuits such as charge, voltage, current and power.
CO2. Describe the principle of operation of D.C. & A.C. machines.
CO3. Outline the working operation of various generating stations.
CO4. Explain the procedure for solving circuits with A.C and D.C. Excitation
CO5. Summarize the performance characteristics of different machines.
CO6. Explain about different equipment used in power industry
CO7. Apply the fundamental laws, associated with Basic Electrical Engineering to solve real world problems in the field of Engineering

CO/PO Mapping

CO / PO mapping	Program Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
To recall fundamental concepts of electrical circuits such as charge, voltage, current and power.	3	3	1	1			3			1			1	1
Describe the principle of operation of D.C. & A.C. machines.	3	2	2	2	2					1			1	1
Outline the working operation of various generating stations.	3	3	3	1	1		1			1			1	1
Explain the procedure for solving circuits with A.C and D.C. Excitation	3	3	2	1	1		2			1			1	1
Summarize the performance characteristics of different machines.	3	3	2	1	1	3	1			1			1	1
Explain about different equipment used in power industry	3	3	2	1		2	2			1		1	3	2
Apply the fundamental laws, associated with Basic Electrical Engineering to solve real world problems in the field of Engineering	3	3	3	3	3	2	2			2		3	3	3

Course designed by	Department of Electrical & Electronics Engineering
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

Basic Electrical Engineering Laboratory

LIST OF EXPERIMENTS

Basic safety precautions, Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope, resistors, capacitors and inductors.

1. Verification of Kirchhoff laws.
2. Verification of Network Theorems.
3. Magnetization characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. Predetermination of performance parameters of 1 – Phase Transformer.
6. I – V Characteristics of Solar PV cell
7. Brake test on DC Shunt Motor.
8. Measurement of earth resistance.
9. Measurement of reactive power in three phase balanced circuit.
10. Measurement of Choke coil parameters
11. Brake test on 3 - Phase Induction Motor.
12. Determination of AC quantities using CRO/DSO.
13. I – V characteristics of battery.

COURSE OUTCOMES:

At the end of the course, Student will be able to

CO 1. Identify common electrical equipment used in laboratory.(L1)

CO 2. Estimate the ratings of different equipment used to perform an experiment. (L2)

CO 3. Demonstrate the usage of various electrical measuring instruments.(L3)

CO 4. Analyze the characteristics of rotating & stationery electrical machines (L4).

CO 5. Interpret the characteristics of PV cell and Battery.(L5)

CO/PO Mapping

CO / PO Mapping	Program Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
Identify common electrical equipment used in laboratory.	3		1	1	3	1			3	2	2	2	2	1
Estimate the ratings of different equipment used to perform an experiment.	3	2	3	3	3	2	1		3	3	2	2	2	3
Demonstrate the usage of various electrical measuring instruments.	2	2	2	2	3	1			3	3	1	2	2	1
Analyze the characteristics of rotating & stationery electrical machines.	3	3	3	3	2				3	3		2	3	2
Interpret the characteristics of PV cell and Battery.	3	3	3	3	3		1		3	3	2	2	3	3

Course designed by	Department of Electrical & Electronics Engineering
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2EHL001	SEMESTER - II	L	T	P	C
	Essential Communication in English	1	-	3	3
	Total Contact Hours – 60				

SYLLABUS

UNIT – I: BASIC LANGUAGE SKILLS – A REFRESHER

Organs of Speech: Consonant Sounds &Vowel Sounds; Phonemic Transcription; Using a Dictionary to know the Pronunciation of a word

Presenting Oneself: Introducing oneself -Using different expressions in Formal&Informal Contexts.

Reading a News Article: Identifying the key words and their usage; summarizing the information

Word Study & Mind Mapping: Root words–Derivatives; Homonyms, Homographs, Homophones; Synonyms & Antonyms

UNIT – II: RUDIMENTS OF FUNDAMENTAL COMMUNICATION

The World: Listening & watching Documentaries on World famous Places.

Describing People, Places and Life experiences: Physical Description- Describing someone's qualities – Usage of Jargon to present topography.

Short Story Corner: Reading a short story – Understanding the mood and essence – Sharing different perspectives.

Sentence Patterns: Concord – Rules – Common errors in day-day usage

UNIT-III: COMMUNICATION AT PRACTICE

Oratory Skills: Listening to World's Famous Speeches

JAM (Just a Minute) Talk: Format & Delivery Techniques

Nuances of Language: Company Description –Position Description (Formal) – processes like Chocolate Making(Informal)**.**

Types of Sentences – Declarative, Interrogative, Assertive etc.

UNIT-IV: COMMUNICATION THROUGH CONCEPTUAL LEARNING

BBC English: Watching interviews of Famous people.

Dialogue Practice: Situational Dialogues; Structuring a Role Play

New Inventions: Reading about latest technology pertaining to different fields (Source : Science Journals)

Transformation of sentences: Active Voice-Passive Voice**,** Direct & Indirect Speech**,** Degrees of Comparison**,** Simple Compound & Complex Sentences.

UNIT – V: COMMUNICATION THROUGH LIFE SKILLS

Watching Movies for Language Enrichment & Writing Reviews.

Skits: Enacting a Skit on a Social Issue

Reflections: Reading News Paper Editorial columns, Literacy Reviews, Poetry

Presenting an autobiography: Exploring different styles of writing autobiographies and evolving an own style**.**

TEXT BOOK:
Reference Source Compilation by the Department

REFERENCES:
1. **Fundamentals of Technical Communication** by Meenakshi Raman,OUP.
2. **Living English Structure** by W.Stannard Allen, Pearson Publications.
3. **English Made Easy** by Mary Margaret Hosler, Mc Graw Hill.
4.. **English and Communication Skills for Students of Science and Engineering**, by Dhanavel, S.P. Orient Blackswan Ltd.
5. **The Oxford Guide to Writing and Speaking** by John Seely , OUP

COURSE OUTCOMES:

CO1. Student will be able to come to terms with the basic language Skills required to cater to the requirement of the programme undertaken.

CO2. Student will be able to comprehend and analyze the core concepts well.

CO3. Student will be able to gain proficiency in all four skills of Language – Listening, Reading, Speaking and Writing.

CO4. Student will be able to understand the Syntactical and Grammatical Components of English Language and their correct use.

CO5: Student will be able to present his/her ideas confidently in a Professional manner.

CO/PO Mapping

Course Title:				**Essential Communication in English**										
Course Code:				A2EHL001										
Course Designed by				Dept. of English & Humanities										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2		2	3	3		3		
CO2						2		2	3	3		3		
CO3						2		2	3	3		3		
CO4						2		2	3	3		3		
CO5						2		2	3	3		3		

Course designed by	DEPARTMENT OF ENGLISH & HUMANITIES
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2ECW201	Semester : II	L	T	P	C
	Subject : Electronics workshop	0	0	3	2
	Total Contact Hours : 48				
	Prerequisite : Semiconductor Physics				

SYLLABUS

List of Experiments

1. Familiarization and testing of basic electronics and electrical components.
2. a) Familiarization of commonly used Equipment and Tools in Electronics laboratory
   b) Simple circuit connection practice on bread board.
3. a) Familiarization of basic electronic instruments in Electronics laboratory.
   b) Measurement of current through and voltages across the components in a given circuit.
4. a) Study of CRO.
   b) Measurement of time period, amplitude, frequency of a signal using CRO.
5. Soldering and De soldering Practice.
6. Study of Logic gates using digital ICs.
7. Assembling and testing of simple electronic circuits using MULTISIM software.
8. Verification of Thevenin's and Norton's theorems using MULTISIM software.
9. a) Familiarization of Computer Hardware.
   b) Dissembling and assembling a Personal Computer.
10. Installation of Operating system on a PC

Course Outcomes

At the end of the course the student will

1. Have the ability to identify various electronic components like resistor, diode, transistor etc.,
2. Have the ability to test various electronic circuits using electronic equipment like multimeter, CRO and function generator.
3. Have the ability to solder and desolder various electronic components.
4. Appreciate Multisim software to test simple electronic circuits.
5. Have the ability to identify different internal parts of a computer and to dissemble and assemble a Personal Computer.
6. Have the ability to install Windows 8 operating system on a Personal Computer.
7. Have the ability to implement simple electronics project.

Mapping COs with Program Outcomes and Program Specific Outcomes

Subject : Electronics Workshop														
Course designed by				Department of Electronics and Communication Engineering										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				1					1			3	1
CO2	3	2			1								3	1
CO3	3								1				3	1
CO4	3	3		3	1				1	2			3	3
CO5	3	1	1	2					2	2			1	3
CO6	3	1	1	2					2	2			1	3
CO7	3	3	3		3				3	1			3	1

Course designed by	DEPARTMENT OF ECE
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

B.Tech(CSE)

MAHARAJ VIJAYARAM GAPATHI RAJ COLLEGE OF ENGINEERING(AUTONOMOUS)
Vijayaram Nagar Campus, Chintalavalasa, Vizianagaram-535005, Andhra Pradesh
Accredited by NAAC with 'A' Grade & Listed u/s 2(f) & 12(B) of UGC
(Approved by AICTE, New Delhi and Permanently Affiliated by JNTUK-Kakinada)
NBA Accredited UG Courses: B.Tech(MEC), B.Tech(CIV), B.Tech(EEE), B.Tech(ECE), B.Tech(CSE), B.Tech(IT), B.Tech(MEC) & B.Tech(CHE) and PG Course: MBA

ACADEMIC REGULATIONS & CURRICULUM

Applicable to the students admitted from the Academic Year 2019-2020

COMPUTER SCIENCE AND ENGINEERING

(B.Tech. Programme)

MAHARAJ VIJAYARAM GAJAPATHI RAJ COLLEGE OF ENGINEERING

(Autonomous)

(Approved by AICTE, New Delhi, and permanently affiliated to JNTUK, Kakinada)

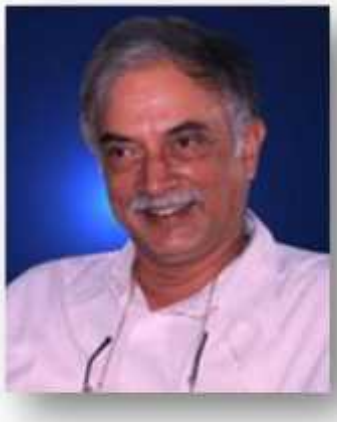
Listed u/s 2(f) & 12(B) of UGC Act 1956.

Vijayaram Nagar Campus, Chintalavalasa,Vizianagaram-535005, Andhra Pradesh

The visionaries

Late Dr. P V G Raju
Raja Saheb of Vizianagaram
Founder Chairman-MANSAS
Ex-Minister for Education and Health, Govt. of AP
Ex Member of Parliament

Late Dr. P. Anand Gajapathi Raju
Ex-Chairman-MANSAS
Ex-Minister for Education and Health
Govt. of AP
Ex Member of Parliament



P. Ashok Gajapathi Raju
Chairman-MANSAS
Ex-Union Minister for Civil Aviation,
Govt. of India
Ex-Minister for Finance, Govt. of AP

Vision

Maharaj Vijayaram Gajapathi Raj College of Engineering strives to become a centre par excellence for technical education where aspiring students can be transformed into skilled and well-rounded professionals with strong understanding of fundamentals, a flair for responsible innovation in engineering practical solutions applying the fundamentals, and confidence and poise to meet the challenges in their chosen professional spheres.

Mission

The management believes imparting quality education in an atmosphere that motivates learning as a social obligation which we owe to the students, their parents/guardians and society at large and hence the effort is to leave no stone unturned in providing the same with all sincerity. Towards that end, the management believes special focus has to be on the following areas:

M1: Have on-board staff with high quality experience and continuously updating themselves with latest research developments and sharing that knowledge with students.

M2: Having a well stream-lined teaching learning process that is continuously assessed for effectiveness and fine-tuned for improvement.

M3: Having state-of-the-art lab and general infrastructure that gives students the necessary tools and means to enhance their knowledge and understanding.

M4: Having a centralized department focused on improving placement opportunities for our students directly on campus and coordinating the training programs for students to complement the curriculum and enhance their career opportunities.

M5: Having advanced research facilities and more importantly atmosphere to encourage students to pursue self-learning on advanced topics and conduct research.

ABOUT THE INSTITUTION:

Maharajah Alak Narayan Society of Arts and Science (MANSAS) is an Educational Trust founded by Dr. (late) P.V.G Raju, Raja Saheb of Vizianagaram in the hallowed memory of his father Maharajah Alak Narayan Gajapati with a view to confound socio-economic inequalities in the Vizianagaram principality executing a trust deed on 12-11-1958 duly established Maharajah's College and other educational institutions in and around Vizianagaram. The Trust is a charitable one published under Section 6 a (1) of A.P Charitable and Hindu Religious Institutions and Endowment Act 30 of 1987.

The object of the Trust is to manage the properties of educational institutions under it and to promote and advance the cause of education in general, besides awarding scholarships to deserving students enabling them to undergo special training in science and industries in and out of India. The Trust has made an uncompromising contribution to the nation by presenting the stalwarts.

Trust offers KG to PhD level education in Arts, Sciences, Law, Pharmacy, Humanities Education, Engineering and Management and presently houses 13 Educational Institutions. MVGR College of Engineering is one of the 13 Institutes.

Other Institutions under MANSAS

1. M.R. HIGH SCHOOL 1857
2. M.R COLLEGE **(NAAC ACCREDITED)** 1879
3. M.R. COLLEGE OF EDUCATION 1950
4. M.R. WOMENS COLLEGE **(NAAC ACCREDITED)** 1962
5. M.R. GIRLS HIGH SCHOOL 1974
6. M.R. MODEL HIGH SCHOOL 1974
7. M.R. ENGLISH MEDIUM SCHOOL 1979
8. M.R.V.R.G.R LAW COLLEGE 1987
9. M.R. P.G. COLLEGE **(NAAC ACCREDITED)** 1987
10. M.R.SCHOOL OF MANAGEMENT STUDIES 1994
11. M.R.V.R.G.R – II MEMORIAL JR. COLLEGE 1994
12. M.R. COLLEGE OF PHARMACY 2004

Maharaj Vijayaram Gajapathi Raj (MVGR) College of Engineering was established in the year 1997 by Maharaj Alak Narayan Society for Arts and Sciences (MANSAS) to impart quality technical education. The Institution is located in lush green, serene and pollution free environment spread over 60 acres of land in Chintalavalasa village situated in the outskirts of Vizianagaram, a fort city in the north coastal region of Andhra Pradesh.

Institution at a glance:

- MVGR is a 22 years old institution, established in 1997
- All eligible UG Programs (CHEMICAL, CIV, CSE, ECE, EEE, IT & MECHANICAL) were reaccredited by NBA.
- MBA program was also re-accredited by NBA.
- Had been re-accredited with Grade 'A' by NAAC of UGC
- Has Permanent affiliation with JN Technological University-Kakinada
- Listed under sections 2(f) & 12(b) of UGC act 1956.
- Approved by AICTE-New Delhi
- EIGHT departments are recognized as RESEARCH CENTERS by JNTU-K
- Granted Autonomy by UGC in 2015
- Campus of 60 acre
- Offering 7 UG and 5 M.Tech., and 1 MBA program
- About 250 faculty of which 84 Ph.D. Degree holders
- 83 Laboratories with an investment of about 13 Crores
- Total built up area of about 7 Lakh Sft
- About 42,000 volumes and Access to 8 international online journal packages like IEEE, SPRINGER, etc.
- 1420 Systems & 395 Mbps band width internet facility
- About Rs. 4 Crore worth of on-going R&D projects
- Actively involved in civil engineering consultancy work as Third Party Quality Auditor for Vizianagaram Municipality
- WIPRO Recognized technology learning center and MISSION 10X partner institution
- Recognized National Instruments Academy for Training in LabView
- SIRO Recognition by DSIR
- Recognized PTC Centre of Excellence for Creo Training
- Identified by MSME as Business Incubation Centre
- APSSDC-Siemens Technical Skill Development Institute
- Recognized CMs SKILL EXCELLENCY CENTER (SEC)
- Microsoft Ed-vantage Platinum Partner
- Institutional member of IUCEE
- Institutional Member of CII
- Member, Chamber of Commerce, Vizianagaram
- Green Campus award by Govt. of AP

MVGR College of Engineering is rated as one among the best engineering colleges in the state of Andhra Pradesh as it set up highest standards in all areas of curricular, co-curricular and extra-curricular activities and in students' placements. Based on industry and expert's feedback, the college is updating the curriculum from time to time. The college offers many value added add-on courses students and conducts training programs to meet the industries' requirements.

Academic Regulations for B.Tech., Program

Applicable to the students admitted from the Academic year 2019-2020 onwards.

1. PROGRAM STRUCTURE:

B.Tech.:

Sl. No	Category	Credits
1	Humanities and Social Sciences including Management courses	12
2	Basic Science courses	25
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	26
4	Professional core courses	54
5	Professional Elective courses relevant to chosen specialization/branch	18
6	Open subjects – Electives from other technical and /or emerging subjects	12
7	Project work, seminar and internship in industry or elsewhere	13
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	0
	Total	160

- Open electives offered by the parent department are listed in the course structure and are offered to students of other programs. The students of parent departments may also opt the course, provided it shall not be listed in the curriculum.
- For audit course a student is deemed to satisfy the minimum contact hours, as prescribed by the department and shall also comply with the requirements for submission of assignments/projects. A student shall also opt for MOOCs and submit the certificate.

1. HSS Courses		
Sl. No.	Subject	Credits
1	English -1	3
2	English -2 (Technical English)	3
3	Elective-1 (Management Related course (MEFA or MS or Operations Research)	3
4	Elective-2 (Professional Ethics and Human Values)	3
	Total	**12**

2. Basic Science Courses		
Sl. No.	Subject	Credits
1	Mathematics-I	3
2	Mathematics-II	3
3	Mathematics-III	3
4	Mathematics-IV	3
5	Applied / Engineering Physics (Theory + Lab)	5
6	Engineering Chemistry (Theory + Lab)	5
7	Biology for Engineers	3
	Total	**25**

3. Engineering Science Courses		
Sl. No.	Subject	Credits
1	Programming for Problem Solving (Theory + Lab)	5
2	Internet of Things (IOT)	3
3	Computer aided Engineering Graphics	3
4	Basic Electrical Engineering (Theory + Lab)	5
5	Department wise Engineering Science Course-I (AI Tools , Techniques & Applications)	5
6	Department wise Engineering Science Course-II (Design thinking and Product Innovation)	3
7	Workshop (Department Specific)	**2**
	Total	**26**

	Subjects	Credits
4	**Professional Core Courses**	54
5	**Professional Elective Courses Relevant to Chosen Specialization/Branch**	18
6	**Open Subjects – Electives from other Technical and / or Emerging Subjects**	12
		84

7. Project		
Sl. No.	Subject	Credits
1	Socially Relevant Project	1
2	Mini Project	2
3	Project Phase - I	2
4	Project Phase - II	8
	Total	**13**

8. Audit Courses (Non Credit Course)		
Sl. No.	Subject	
1	Induction Program	
2	Constitution of India	
3	Indian Traditional Knowledge	
4	Environmental Science	

BOS Chairman shall notify the list of MOOCs offered (Open Elective & Professional Elective) in the beginning of the semester.

2. PROGRAM PATTERN:

B.Tech.: The program is for 4 academic years / 8 semesters.

B.Tech. (Lateral Entry): The program is for 3 academic years / 6 semesters.

3. AWARD OF DEGREE:

B.TECH:

A student will be declared eligible for the award of degree if he/she fulfills the following academic regulations.

a) A student shall be declared eligible for the award of degree, if he/she pursues a course of study for not less than four academic years and not more than eight academic years from the date of admission.

b) The student shall register for **160** credits and secure all **160** credits.

c) A student shall also register and successfully complete audit programs (Non-credit) as recommended by Academic Council.

d) A student on completing 1st year class work may opt for a break of 1 year which shall be deemed as GAP year, as recommended by APSCHE, for undertaking successful entrepreneurial ventures.

e) Students who fail to complete Four Years Course of study within 8 years shall forfeit their seat and their admission shall stand cancelled.

B.TECH (Lateral Entry):

A student will be declared eligible for the award of degree on fulfilling the following academic requirements.

a) A student shall be declared eligible for the award of the degree, if he/she pursues a course of study for not less than three academic years and not more than six academic years.

b) The student shall register for **126** credits and secure all **126** credits.

c) A student shall also register and successfully complete audit programs (Non-credit) as recommended by Academic Council.

d) Students who fail to complete their three Years Course of study within 6 years shall forfeit their seat and their admission shall stand cancelled.

e) Student shall register for bridge programs, if any, as administered by the respective departments at the beginning of 2nd year and successfully complete as per the guidelines of the Institution.

4. CERTIFICATION PROGRAMS:

Sl. No.	Dept.	Name of the Program
1	MECH	Windchill 10.2 PDM by Adroitec Engineering Solutions Pvt. Ltd., Hyderabad
2	MECH	Creo 2.0 by PTC
3	MECH	Edgecam by Verosoft, UK
4	MECH	ANSYS Training and Certification by Mechanical Department
5	MECH	AUTOCAD Training and Certification by Mechanical Department
6	MECH	Catia by APSSDC-Dassault Systems, CM's Center of Excellence
7	MECH	Delmia by APSSDC-Dassault Systems, CM's Center of Excellence
8	MECH	Simulia by APSSDC-Dassault Systems, CM's Center of Excellence
9	MECH	2-Wheeler Automobile Certification by APSSDC-SIEMENS
10	MECH	4-Wheeler Automobile Certification by APSSDC-SIEMENS
11	MECH	Welding Certification by APSSDC-SIEMENS
12	MECH	CNC Certification by APSSDC-SIEMENS
13	MECH	Commercial Electrical Certification by APSSDC-SIEMENS
14	MECH	Solid Edge Certification by APSSDC-SIEMENS
15	CHEM	Chemical Process Design and Simulation by Simtech Simulations, Hyderabad
16	ECE	Embedded Systems by Think LABS, Mumbai
17	ECE	Labview by National Instruments Systems India Pvt. Ltd.
18	ECE	Unified Technology Learning Program (UTLP) by Wipro Mission 10X
19	CSE, IT	PEGA by Virtusa Corporation
20	CSE, IT	Microsoft technologies by Microsoft Corp.
21	CSE, IT	Ethical Hacking by EC-Council Academia
22	CSE, IT	Java and C by Talent Sprint
23	CSE, IT	Network Analyst (CCNA) by Cisco Systems Inc
24	CSE, IT	Java Programming (OCJP) and DBMS by Oracle
25	EEE	PLC, Drives and Automation by Siemens
26	EEE	PLC by New Dawn Automation
27	EEE	Home Electrical Certification by APSSDC-SIEMENS
28	Civil	Remote Sensing and GIS by Indian Institute of Remote Sensing

a) The Institution shall offer the certification programs by itself or in collaboration with industry/such other Institutions deemed to have specialized expertise in the proposed area of training.
b) Only students of the Institution shall be eligible to register on payment of prescribed fee.
c) However, subject to availability of resources and the demand the Institution may offer the program to external candidates meeting the pre-qualification requirements and in the order of the merit.
d) The duration of the course and design of the content shall be done by the respective departments of the Institution by themselves or in collaboration with industry/such other institutions deemed to have specialized expertise in the proposed area of training.
e) If the duration of the course is less than or equal to 40 hours, it can be completed in one semester, otherwise, it can suitably distributed over a number of semesters.
f) Mere enrolment/registration for the program shall not entitle any claim for award of certificate.
g) A candidate shall be deemed eligible for the award of the certificate if he/she
   - Attends at least 75% of scheduled training sessions
   - Complies to all the requirements of submission of the assignments, presentations, seminars, projects, etc., and also appears for periodic tests.
   - Shall attain minimum levels of performance in tests as prescribed.
   - Shall remit such fee as deemed fit for the certification
   - A candidate registered and failed to meet the requirements shall be permitted to repeat the said training one another time after remitting 25% of the fee fixed for the program as re-registration fee.

If the student is absent for the periodic tests, the test shall be re-conducted on payment of 10% of fee.

5. COURSES OFFERED:

Name of the Program	Degree
UG Programs (Engineering & Technology)	B.Tech. (Civil) B.Tech. (EEE) B.Tech. (Mech.) B.Tech. (ECE) B.Tech. (CSE) B.Tech. (CHEM) B.Tech. (IT)
PG Programs (Engineering & Technology)	M.Tech. (Structural Engineering) M.Tech. (Power Systems) M.Tech. (PDM) M.Tech. (VLSI) M.Tech. (CN&IS)
Other PG Programs	MBA
Research Programs	Ph.D. in Civil, EEE, MECH, ECE, CSE, CHEM, MBA and MATHS

6. DISTRIBUTION AND WEIGHTAGE OF MARKS:

B.Tech.:

a). All Theory courses will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment:

Subjective tests	- 20 Marks
Objective tests	- 10 Marks
Assignments	- 10 Marks

- Two subjective tests shall be conducted.
- Each subjective test shall be conducted for 90 Minutes and have 3 questions each for 7 marks (No choice) and the same shall be scaled down to 20 Marks.
- Average of two subjective tests shall be considered.
- Two objective tests (online) shall be conducted each for 20 marks.
- Each objective test shall be conducted for 20 minutes and have 20 Multiple Choice Questions each for 1 mark and the same shall be scaled down to 10 Marks.
- Average of two objective tests shall be considered.
- Assignments shall be assessed for 10 marks.

External Assessment:

- External examination is for 60 marks (180 min). Question paper contains 10 questions (2 questions from each unit) and each question carries 12 marks. Student shall answer 5 questions (1 question from each unit).

b). **Laboratory/Practice:**

All Laboratory/Practice courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

- Continuous assessment for 15 marks for each experimental session finally averaged to 15 marks.
- Project based learning shall be assessed for 15 Marks.
- In Project based learning, a student has to identify a problem such that at least 3 or 4 modular learning of experiments shall be integrated and submit comprehensive report with solution at the end of the semester.
- An internal assessment test conducted at the end of the semester shall be assessed for 10 marks.

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Both internal and external examination shall include assessment of the student on
    a) Knowledge of principles/concepts involved
    b) Experimental design
    c) Result interpretation and analysis
    d) Experimental report

c). **Drawing/Design/Estimation:**

i) Computer Aided Engineering Graphics:

Evaluation Procedure:

The course will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Question paper contains 3 questions (with internal choice). **E**ach question carries 20 marks (5 marks for free hand drawing and list of commands & 15 marks for final drawing prepared in AUTOCAD). A Student shall answer all questions.

ii) Modeling and Assembly of Mechanical Elements:

Evaluation Procedure:

The course will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Semester End Examination shall include assessment of the student on Final drawings like modeling, assembly and drafting.
- Student is expected to execute one exercise.
- Final drawings like modeling, assembly and drafting hard copies shall be evaluated by both internal and external examiners

Integrated Course (Theory + Lab):

Theory and Lab shall be assessed for 200 Marks (Each 100 marks)

- For Integrated course, the theory shall be assessed for 100 marks, of which 40 marks for internal assessment and 60 marks for semester end external examination.
- The Lab shall be assessed for 100 marks , of which, 40 marks for internal assessment and 60 marks for semester end external examination

Socially Relevant Project:

- A student shall identify and provide a solution to the problem relevant to society/Profession/Industry.
- A student shall engage at least 15 hours on socially relevant project. Socially relevant project shall be evaluated internally for 50 marks by Project Review Committee (PRC). PRC comprising of HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide shall review the progress.

Mini Project:

- A student shall undergo internship for a period of 4 weeks/provide solution to the problem relevant to Industry/ Modern tool during the vacation after VI semester and submit comprehensive report.
  - Mini project shall be evaluated internally for 50 marks by Project Review Committee (PRC).
  - PRC shall prepare rubrics for assessment.

Project Evaluation:

Project is divided into 2 phases – Phase I & Phase II

- Evaluation shall comprise of internal and external assessment.
  Internal: 110 (Phase I 50 marks, Phase II 60 Marks)
  External: 90
- A project Review committee (PRC) comprising of HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide shall review the progress once in four weeks.

Project Phase I:

- Project Phase I shall be evaluated internally by PRC for 50 Marks.
- A student shall undertake project phase I during the VII semester.
- A student shall report to the guide/external supervisor and work under his supervision at least 2 hours per week.
- Assessment shall be on
  - Literature review
  - Identification and statement of the Problem

Project Phase II:

- A student shall undertake project phase II during the VIII semester.
- A student shall report to the guide/external supervisor and work under his supervision at least 8 hours per week.
- Internal evaluation shall be done by HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide for 60 marks.
- External evaluation shall be done by HoD, Guide/Internal Examiner and External Examiner for 90 marks.
- Assessment shall be on
  a) Review on fundamental knowledge involved
  b) Inter disciplinary aspect
  c) Experimental/methodology design
  d) Result analysis and interpretations
  e) Report writing
  f) Team work
  g) Presentation
  h) Viva-voce

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2^{nd}, 3^{rd} and 4^{th} years of study shall be same as applicable to regular B.Tech students.

7. ATTENDANCE REGULATIONS:

B.Tech.:

I. A student shall be eligible to appear for end semester examinations, if he or she acquires a minimum of 75% of attendance in aggregate of all the subjects (Theory & Lab.) for the semester.
II. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the college academic committee.
III. Shortage of attendance below 65% in aggregate of all the subjects (Theory & Lab) for the semester shall not be Condoned.
IV. Detained student shall seek re- admission for that semester when offered within 4 weeks from the date of commencement of class work.

PROMOTION RULE (Based on attendance):

- A Student shall be promoted to the next semester on fulfillment of minimum attendance requirement (75%) of current semester.

PROMOTION RULE (Based on credits):

- A student shall be promoted from IV semester to V semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to IV semester from the following examinations irrespective of whether the candidate takes the examination or not.
    - Two regular and Two supplementary examinations of I semester
    - Two regular and One supplementary examinations of II semester
    - One regular examination and One supplementary examination of III semester
    - One regular examination of IV semester.

- A student shall be promoted from VI semester to VII semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to IV semester from the following examinations irrespective of whether the candidate takes the examination or not.
    - Three regular and Three supplementary examinations of I semester
    - Three regular and Two supplementary examinations of II semester
    - Two regular and Two supplementary examinations of III semester
    - Two regular and One supplementary examinations of IV semester
    - One regular and One supplementary examination of V semester
    - One regular examination of VI semester.

B.TECH (Lateral Entry):

PROMOTION RULE (Based on attendance):

A Student shall be promoted to the next semester on fulfillment of minimum attendance requirement of current semester.

PROMOTION RULE (Based on credits):

A student shall be promoted from VI semester to VII semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to VI semester from the following examinations irrespective of whether the candidate takes the examination or not.

- Two regular and Two supplementary examinations of III semester
- Two regular and one supplementary examinations of IV semester
- One regular and One supplementary examinations of V semester
- One regular examination of VI semester.

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2nd, 3rd and 4th years of study shall be same as applicable to regular B.Tech students.

8. MINIMUM ACADEMIC REQUIREMENTS:

B.Tech.: (Theory/Lab)

i. A student is deemed to have satisfied the minimum academic requirements for a course on securing at least 24 marks out of 60 marks at semester end examination and overall minimum of 40 marks out of 100 marks including internal assessment.

ii. **Integrated Course (Theory + Lab):**

- The student shall secure minimum 24 marks out of 60 marks at semester end examination and overall 40 marks out of 100 marks for Theory and Laboratory courses independently. In case of failure in either theory or Laboratory course, the student should re-appear for both theory and laboratory.
- The assessment shall be done independently for both theory and laboratory courses and final marks shall be calculated on weighted average method for converting marks into grade points.

  Sample calculation:

  Integrated course-5 credits. Theory is for 3 credits and laboratory is for 2 credits.

  Total Marks obtained in theory: 70 out of 100 (3 Credits)

  Total Marks obtained in Lab : 90 out of 100 (2 Credits)

  Final marks of the integrated course is

  (70X3 + 90X2) / 5 = 78 Marks

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2nd, 3rd and 4th years of study shall be same as applicable to regular B.Tech students.

9. GRADING SYSTEM:

B.Tech. / B.Tech. (Lateral Entry)

Semester Grade Point Average (SGPA) for the current semester which is calculated on the basis of grade points obtained in all courses, except audit courses and courses in which satisfactory or course continuation has been awarded,

SGPA= Σ (course credits earned x Grade points) /
Σ (Total course credits in the semester.

CGPA= Σ (course credits earned x Grade points) up to successfully completed semesters / Σ (Total course credits up to successfully completed.

The UGC recommends a 10-point grading system with the following letter grades as

given below:

O	(Outstanding)	10
A+	(Excellent)	9
A	(Very Good)	8
B+	(Good)	7
B	(Above Average)	6
C	(Average)	5
P	(Pass)	4
F	(Fail)	0
Ab	(Absent)	0

- iii. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X10 = 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			**139**

Thus, **SGPA =139/20 = 6.95**

Illustration for CGPA

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
Credits: 16	Credits: 18	Credits: 25	Credits: 21	Credits: 23	Credits: 22
SGPA: 7.9	SGPA: 7.8	SGPA: 7.6	SGPA: 8.0	SGPA: 8.3	SGPA: 8.6

Semester 7	Semester 8
Credits: 21	Credits:14
SGPA: 8.2	SGPA: 8.5

Thus,

CGPA= $\frac{16x7.9 + 18x7.8 + 25x7.6 + 21x8.0 + 23x8.3 + 22x8.6 + 21x8.2 + 14x8.5}{160}$ = **8.1**

10. ELIGIBILITY FOR AWARD OF DEGREE:

B.Tech:

A student shall be eligible for award of the degree if he/she fulfills the following conditions:

1) Successfully completes all the courses prescribed for the Program.
2) CGPA greater than or equal to 4.5(Minimum requirement for Pass),

11. AWARD OF CLASS:

B.Tech:

Eligible Candidates for the award of B.Tech., Degree shall be placed in one of the following Classes based on CGPA.

Class	CGPA
Distinction	≥ 7.5
First Class	≥ 6.5
Second Class	≥ 5.5
Pass class	≥ 4.5

12. INSTRUCTION DAYS:

A semester shall have a minimum of 90 clear instruction days (including internal examinations).

13. Transfers from other Institutions shall not be permitted.

14. SUPPLEMENTARY EXAMINATIONS:

Supplementary examinations shall be conducted within 4 weeks from the date of announcement of results of regular examinations.

15. WITHHOLDING OF RESULTS: The result of a student shall be withheld

- If the student has not paid the dues, if any, to the institution
- If any case of pending disciplinary action ,
- Involvement in any sort of malpractices etc.
- Involvement in ragging.

16. TRANSITORY REGULATIONS:

A Candidate shall be readmitted from University regulations to A1 regulations or from A1 regulations to A2 regulations as per the guide lines of JNTUK.

17. AMENDMENTS TO REGULATIONS:

The Academic Council of MVGR College of Engineering (Autonomous) reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations, and/ or Syllabi or any other such matter relating to the requirements of the program which are compatible to the contemporary/emerging trends effectively meeting the needs of society/industry/stake holding groups.

18. Regulations for MALPRACTICES during the conduct of examinations

	Nature of Malpractices/Improper conduct	Punishment
1 (a)	If the candidate possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only. *
(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. *

2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled. *
3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider/candidate not on rolls, he will be handed over to the police and a case is registered against him. *
4	If the candidate mishandles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. Also if the answer script is mutilated / damaged disturbing the shape, of the script, answers, the bar code intentionally.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. He shall be debarred from class work and all examinations and be allowed to reregistered for the next subsequent odd or even semester only. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.*

5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	The same should be brought to the notice of CE who in turn in consultation with malpractice committee makes decision for cancellation of the performance in that subject. *
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. *
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. *
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. *

9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. *
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. *
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.*

*

19. General :

- Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
- The academic regulation should be read as a whole for the purpose of any interpretation.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

* * *

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

- ⇨ **Ragging within or outside any educational institution is prohibited.**
- ⇨ **Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student**

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	 2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	 10 Months	+	Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE MVGR A RAGGING FREE CAMPUS

Ragging

ABSOLUTELY NO TO RAGGING

1. **Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.**
2. **Ragging entails heavy fines and/or imprisonment.**
3. **Ragging invokes suspension and dismissal from the College.**
4. **Outsiders are prohibited from entering the College and Hostel without permission.**
5. **Girl students must be in their hostel rooms by 7.00 p.m.**
6. **All the students must carry their Identity Cards and show them when demanded**
7. **The Principal and the Wardens may visit the Hostels and inspect the rooms any time.**

PROGRAM STRUCTURE

B.Tech. (COMPUTER SCIENCE & ENGINEERING)

Semester - I						
S. No	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	A2MAT101	Mathematics-I	3	-	-	3
2	A2PYI102	Applied Physics (Theory + Lab)	3	-	3	5
3	A2CII201	Programming for Problem Solving (Theory + Lab)	3	-	3	5
4	A2MED201	Computer Aided Engineering Graphics	1	-	4	3
5	A2EHA701	Constitution of India	2	-	-	0
						16
Semester - II						
S. No	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	A2MAT103	Mathematics-II	3	-	0	3
2	A2CYI101	Engineering Chemistry (Theory + Lab)	3	-	3	5
3	A2EEI201	Basic Electrical Engineering (Theory + Lab)	3	-	3	5
4	A2CIW201	Basic IT Tools Workshop	-	-	4	2
5	A2EHL001	English-I	1	-	3	3
						18
Semester - III						
S. No	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	A2CIT202	Design Thinking and Product Innovation	3	-	-	3
2	A2CIT301	Digital Logic Design	3	-	-	3
3	A2CII301	Data Structures	3	-	3	5
4	A2CII302	Programming with Python	2	-	3	4
5	A2XXT5XX	Open Elective-I	3	-	-	3
6	A2MAT104	Mathematics-III	3	-	-	3
7	A2MST001	Managerial Economics & Financial Analysis	3	-	-	3
8	A2EHA702	Indian Traditional Knowledge	2	-	-	0
						24

Semester - IV

S. No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2CII303	Database Management Systems	3	-	3	5
2	A2CII304	Object Oriented Programming	3	-	3	5
3	A2CIT302	Computer Organization & Architecture	3	-	-	3
4	A2XXT5XX	Open Elective-II	3	-	-	3
5	A2MAT108	Mathematics-IV	3	-	-	3
6	A2XXT1XX	Biology for Engineers	3	-	-	3
7	A2CHA701	Environmental Science	2	-	-	0
						22

Semester - V

S. No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2CII202	AI Tools, Techniques & Applications	3	-	3	5
2	A2CII305	Computer Networks	3	-	3	5
3	A2CIT303	Design & Analysis of Algorithms	3	-	-	3
4	A2CIT304	Operating Systems	3	-	-	3
5	A2CIT305	Automata Theory & Compiler Design	3	-	-	3
6	A2CIT4XX	Professional Elective-I	3	-	-	3
7	A2CIP601	Socially Relevant Project	-	-	2	1
						23

Semester - VI

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2CII306	Web Technologies	3	-	3	5
2	A2CIT306	Software Engineering	3	-	-	3
3	A2CIT307	Microprocessors & Interfacing	3	-	-	3
4	A2CIT4XX	Professional Elective-II	3	-	-	3
5	A2CIT4XX	Professional Elective-III	3	-	-	3
6	A2EHL002	English-II (Technical English)	3	-	-	3
7	A2CIP602	Mini Project	-	-	4	2
						22

Semester – VII						
S.No	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	A2CIT201	Internet of Things (IOT)	3	-	-	3
2	A2EHT001	Professional Ethics and Human Values	3	-	-	3
3	A2CIT308	Object Oriented Design & Analysis and Design Patterns	4	-	-	4
4	A2CIT4XX	Professional Elective-IV	3	-	-	3
5	A2CIT4XX	Professional Elective-V	3	-	-	3
6	A2CIT4XX	Professional Elective-VI	3	-	-	3
7	A2CIP603	Project Phase-I	-	-	4	2
						21
Semester – VIII						
S. No	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	A2XXT5XX	Open Elective-III (MOOCs)	3	-	-	3
2	A2XXT5XX	Open Elective-IV (MOOCS)	3	-	-	3
3	A2CIP604	Project Phase - II	-	-	16	8
						14

ELECTIVE STREAMS (MAJORS)

CI-EG1 (Code-1) – Business Intelligence (A2CIT41X)	
Subject Code	**Subject**
A2CIT411	Data Warehousing & Mining
A2CIT412	Statistical & Predictive Analytics
A2CIT413	Data Analytics & Tools
A2CIT414	Machine Learning

CI-EG2 (Code-2) – Networks (A2CIT42X)	
Subject Code	**Subject**
A2CIT421	Routing and Switching Concepts
A2CIT422	Firewalls & VPN
A2CIT423	Penetration Testing
A2CIT424	Information Security and Management Standards

CI-EG3 (Code-3) – Architecture (A2CIT43X)	
Subject Code	**Subject**
A2CIT431	Service Oriented Architecture
A2CIT432	Middleware Technologies
A2CIT433	Block chain fundamentals
A2CIT434	.NET Technologies/EJB

CI-EG4 (Code-4) – Applications (A2CIT44X)	
Subject Code	**Subject**
A2CIT441	Bio-Informatics
A2CIT442	Digital Image Processing
A2CIT443	Digital Forensics & Investigations
A2CIT444	E-Commerce

Core Elective – V (A2CIT4XX)	
Subject Code	**Subject**
A2CIT411	Data Warehousing & Mining*
A2CIT421	Routing and Switching Concepts*
A2CIT431	Service Oriented Architecture*

Core Elective – VI (Code-6) (A2CIT46X)	
Subject Code	**Subject**
A2CIT461	Natural Language Processing
A2CIT462	Cryptography and Information Security
A2CIT463	Cloud Computing (Salesforce/Amazon)
A2CIT464	Enterprise Resource Planning
A2CIT433	Block chain fundamentals*

* *Cannot Opt if already completed*

GUIDELINES FOR CHOOSING THE CORE ELECTIVES

- A Student has an option to choose **ONE** among the following Streams as a Major Group and complete 4 courses listed that group as Core Electives I, II, III and IV from the respective group.

    1. Business Intelligence
    2. Networks
    3. Architecture
    4. Applications

- A Student has to choose any ONE from the list of courses in the table of Core Elective – V, which he has not studied earlier.
- A Student may choose any ONE among the courses Listed in Core Elective – VI table, which he has not studied earlier.

OPEN ELECTIVES (Code – 5)

The Open Electives offered by the departments of CSE & IT are as follows:

Subject Code	Subject
A2CIT501	Fundamentals of Data Structures
A2CIT502	Object Oriented Programming with JAVA
A2CIT503	Web Design & Development
A2CIT504	Python Programming
A2CIT505	NoSQL Databases
A2CIT506	Data Analytics

A2MAT101	SEMESTER - I	L	T	P	C
	MATHEMATICS-I (common to ALL branches)	3	0	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: LINEAR ALGEBRA-1

Rank of a matrix: Elementary row and column transformations, equivalent matrices, Echelon form of a matrix, calculation of rank by reducing the matrix to Echelon form. System of equations: Linear system of equations, homogeneous and non-homogeneous system of equations, consistency criteria, trivial and non-trivial solutions, solving system of equations by Rank method; Eigenvalues and Eigenvectors: Finding Eigenvalues and Eigenvectors, properties of Eigenvalues and Eigenvectors (statements) including spectral mapping theorem.

UNIT- II: LINEAR ALGEBRA-2

Cayley-Hamilton Theorem: Statement of the theorem and its verification. Applications: Finding higher powers of a matrix, finding matrix polynomials, finding inverse of matrix. Diagonal form of a matrix: Reduction to diagonal form, spectral and modal matrices, finding higher powers of a matrix using diagonalisation, Quadratic forms: Matrix form of quadratic forms, orthogonal transformation, canonical form, reduction of quadratic form to canonical form by orthogonal transformation method, rank, index, signature and nature (definiteness) of a quadratic form.

UNIT-III: FIRST ORDER DIFFERENTIAL EQUATIONS & APPLICATIONS

Outlines: Differential Equations(DEs), Order and degree of a DE, Formation of DEs, general solutions of a DE; Solving first order and first degree DEs: linear DEs, Bernoulli's DEs (reducible to linear), exact DEs, integrating factors, non-exact DEs (reducible to exact).

Applications to real world problems: Newton's law of cooling, laws of growth and decay, family of curves, orthogonality of families curves, orthogonal trajectories (Cartesian and polar curves).

UNIT-IV: HIGHER ORDER DIFFERENTIAL EQUATIONS

Differential equations of higher order: Linear differential equations of higher order, its operator form. Solution concepts: General (complete) solution, particular solution. Solution of linear differential equations of higher order: Auxiliary equations, rules for finding complementary functions, rules for finding particular integrals (general and special methods).

UNIT-V: LAPLACE TRANSFORMS

Laplace transformation: Laplace transformation of elementary functions, Properties: Linearity, change of scale, first shifting properties, finding Laplace transformations using properties, Advanced properties: Laplace transformations of derivatives and integrals, multiplication by t^n, division by t (statements), finding Laplace transformations

using advanced properties; Inverse Laplace transformations: Finding inverse Laplace transformations using partial fractions, statement of Convolution theorem, finding inverse Laplace transformations by Convolution theorem; Applications: Solving Initial Value Problems by using Laplace transformations.

//Topics prefixed with 'outlines / overview' are not for assessment//

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017
2. T.K.V. Iyengar et al, Engineering Mathematics, S. Chand Publishers, Revised edition

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010
3. T. Veerarajan, Higher Engineering Mathematics, Tata McGraw-Hill, 2008

COURSE OUTCOMES: Learners at the end of this course will be able to

CO 1	KO#1	Recall the concepts of Linear algebra
CO 2	KO#2	Recall the solution methods and applicability of first order differential equations
CO 3	KO#3	Recall the solution methods of higher order differential equations and the concepts of Laplace transforms
CO 4	UO#1	Use and interpret the concepts of linear algebra
CO 5	UO#2	Use and interpret solution methods and applicability of first order differential equations
CO 6	UO#3	Use and interpret solution methods of higher order differential equations and the concepts of Laplace transforms
CO 7	AO#1	Apply the concepts of linear algebra, differential equations and Laplace transformation to model and solve real world problems

CO/PO Mapping

Course Title:	Mathematics-I (Common to ALL Branches)													
Course Code:	A2MAT101													
Course Designed by	Dept. of Mathematics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2							2			
CO2	3	3		2							2			
CO3	3	3		2							2			
CO4	3	3		2							2			
CO5	3	3		2							2			
CO6	3	3		2							2			
CO7	3	3		2							2			

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 06.07.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PYI102	SEMESTER – I	L	T	P	C
	APPLIED PHYSICS (COMMON TO EEE,ECE, CSE & IT)	3	-	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: WAVE OPTICS [10hrs]

Interference: Introduction- Coherence– Young's double slit experiment- Theory of interference fringes- Interference in thin parallel film by reflection (under reflected light)- Newton's Rings- Applications.

Diffraction: Introduction **-** Fraunhofer diffraction at- Single slit– Double slit (qualitative)- Diffraction Grating.

Polarization: Introduction– Polarization by refection- Brewsters law- Double refraction– Nicol Prism– Theory of Plane, circular and elliptically polarized light – Quarter wave & Half wave plate

UNIT-II: MAGNETIC PROPERTIES OF MATERIALS [8hrs]

Introduction– Origin of Magnetic moment in atom– Classification of magnetic materials– Ferromagnetism- Weiss theory (qualitative)- Domain theory- Hysteresis- Soft & Hard magnetic materials- Ferrites- Garnets- Applications.

UNIT-III: DIELECTRIC PROPERTIES OF MATERIALS [8hrs]

Introduction– Types of Polarization- Electronic- Ionic- Orientation polarization– Internal field- Clausius Mossoiti relation- Frequency dependency of polarization- Dielectric loss- Loss Tangent- Ferro electricity- Piezoelectricity- P-E loop- Applications.

Unit-IV: HEAT TRANSFER [10hrs]

Transfer of heat energy- conduction, convection and radiation and their fundamental laws. Thermal expansion of solids and liquids - expansion joints -bimetallic strips. Heat conductions in solids- thermal conductivity - Forbe's and Lee's disc method: theory and experiment - applications (qualitative). Working principles of heat exchangers- refrigerators- ovens- solar water heaters.

UNIT–V: QUANTUM PHYSICS & SEMICONDUCTORS [12hrs]

Quantum Physics: Introduction- Matter wave– Davisson Germer Experiment- Schrodinger's wave equations– Wave function– Particle in potential box– Origin of energy bands.

Introduction- Intrinsic semiconductors– Carrier concentration (qualitative)– Electrical conductivity- Extrinsic semiconductors– Carrier concentration (qualitative)- Drift and Diffusion currents- Direct and Indirect band gap semiconductors- Light emitting diode– Solar cell- Hall effect- Applications.

TEXTBOOKS:

1. R.K.GAUR and S.L.GUPTA, Engineering Physics, Dhanpat Rai Publications

REFERENCES:

1. RESNICK, HALLIDAY and WALKER, Principles of Physics, Wiley Publishers
2. P.K. NAG, Heat and Mass Transfer, Mc Graw Hill Publishers.
3. B.K. PANDEY and S. CHATURVEDI, Engineering Physics, Cengage Learning Publishers.

COURSE OUTCOMES:

CO1. Student will be able to gain knowledge on basics of interference, diffraction and polarization of light.

CO2. Student will be able to gain knowledge on fundamentals of magnetic properties of materials and the polarization mechanisms of dielectrics.

CO3. Student will be able to gain knowledge on modes of heat transfer and the essentials of quantum physics & semiconductors for engineers.

CO4. The students will be able to understand and recognize the principle behind working of optical devices.

CO5. The students will be able to understand and recognize the underlying property behind working of electric and magnetic components in devices.

CO6. The students will be able to understand and recognize the importance of heat transfer and quantum mechanics based semiconductor devices.

CO7. The students will have the ability to apply the conceptual knowledge of principles of quantum physics in designing and developing engineering applications.

CO/PO MAPPING:

Course Title:	Applied Physics (Common to ECE, CSE & IT Branches)													
Course Code:	A2PYI102													
Course Designed by	Dept. of Physics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3						1				1		
CO2	3	3						1				1		
CO3	3	3						1				1		
CO4	3	3						1				1		
CO5	3	3						1				1		
CO6	3	3						1				1		
CO7	3	3						1				1		

Course designed by	DEPARTMENT OF PHYSICS
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PYI102	SEMESTER – I	L	T	P	C
	APPLIED PHYSICS LAB (COMMON TO EEE,ECE, CSE & IT)	-	-	3	2
	Total Contact Hours – 42				

LIST OF EXPERIMENTS

1.	Determination of the radius of curvature of the plano-convex lens by Newton's Rings method.
2.	Determination of the thickness of the thin object (hair/paper) by Wedge method.
3.	Determination of the prominent spectral line wavelengths in mercury spectrum by normal incidence method.
4.	Obtain the signature variation of the axial magnetic field for a circular coil carrying current.
5.	Estimation of the hysteresis loss for a ferromagnetic material.
6.	Determination of thermal conductivity coefficient of the disc shaped material.
7.	Determination of energy band gap of the semiconductor by using junction diode.
8.	To plot I/V Characteristics of Zener diode.
9.	Determination of temperature coefficient of the thermistor.
10.	To plot frequency response characteristics of the L.C.R series circuit.

TEXTBOOKS:

1. BALASUBRAMANIAN.S, SRINIVASAN.M..N, A Text book of Practical Physics, S Chand Publishers, 2017

REFERENCES:

1. https://vlab.amrita.edu.

COURSE OUTCOMES:

CO1. Design experiments to demonstrate and investigate the interference and diffraction patterns of light.

CO2. Design experiments for signature variation of magnetic field due to current and the hysteresis loss in magnetic materials.

CO3. Design experiment to determine the thermal conductivity coefficient (K) of a material.

CO4. Design L.C.R series circuits for desired applications based on their frequency response characteristics.

CO5. Design experiments for determining the physiognomies of the semiconductor devices like the energy band gap, breakdown voltage and coefficient of resistance.

CO/PO MAPPING:

Course Title:	Applied Physics Lab (Common to ECE, CSE & IT Branches)													
Course Code:	A2PYI102													
Course Designed by	Dept. of Physics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3						1	2	1		1		
CO2	3	3						1	2	1		1		
CO3	3	3						1	2	1		1		
CO4	3	3						1	2	1		1		
CO5	3	3						1	2	1		1		

Course designed by	DEPARTMENT OF PHYSICS
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CIT201	SEMESTER – I	L	T	P	C
	PROGRAMMING FOR PROBLEM SOLVING	3	0	0	3
	Total Contact Hours : 54				
	Prerequisites: Mathematics				

COURSE OBJECTIVES

COBJ1.	Students will study systematic approach to problem solution specification using finite number of unambiguous steps.
COBJ2.	Students will gain understanding of procedural language features using C as the template.
COBJ3.	Students will read and analyse alternative construct choices in procedural language C.
COBJ4.	Students will get exposure to systematic approach of automated solution design, implementation and testing using a procedural language.

SYLLABUS

UNIT – I: [9 HOURS]

INTRODUCTION: Introduction to Programming, Computer System, Hardware and Software concepts.

PROBLEM SOLVING: Algorithm, Pseudo-code, flow-chart, program development steps, high-level, Assembly and machine languages.

BASICS OF C PROGRAMMING: Structure of C program, identifier, basic data types and sizes, constants, variables, arithmetic operators, relational operators, logical operators, increment and decrement operators, assignment operator, conditional operator, scanf and printf built-in functions, Creating and running programs.

UNIT – II: [9 HOURS]

BIT-WISE OPERATORS: logical, shift, rotation, masks.

EXPRESSIONS: expressions, type conversions, conditional expressions, precedence and order of evaluation.

SELECTION: Two-way selection: if-else, nested if, examples, multi-way selection: switch, else-if, examples.

ITERATIVE: loops - while, do-while and for statements, break continue, event and counter controlled loops.

UNIT – III: [18 HOURS]

Part – I: [9 HOURS]

ARRAYS: Arrays (1-D, 2-D), Character arrays and Strings, Searching (Linear Search and Binary Search).

Part – II: [9 HOURS]

BASIC ALGORITHMS: Basic Sorting Algorithms (Bubble, Insertion and Selection), comparing algorithms for complexity.

FUNCTIONS: Functions, Scope and Extent of Variables, Function Parameters, parameter passing using call-by-value, sub-routines, Storage Classes,#define,#ifdef, #ifndef pre-processor directives.

UNIT – IV: [9 HOURS]

RECURSION: Definition of Recursion, example programs using recursion like finding Factorial, Fibonacci series, Quick sort, puzzle solving using recursive functions (towers of hanoi, ackerman function).

POINTERS: Definition of Pointers, Pointer Type, Pointer Arithmetic, Function parameter passing using call-by-reference.

MEMORY ALLOCATION: Difference between static and dynamic memory allocation, dynamic memory allocation using built-in functions, dangling pointer, unreferenced memory problem.

UNIT – V: [9 HOURS]

ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, bit-fields, concept of linked list, program applications.

FILE-HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, command line arguments.

Suggested Text Books

1. Programming For Problem Solving, Behrouz A.Forouzan & Richard F.Gilberg, Cengage Publishers, 3rd Edition
2. Programming In C:A Practical Approach, Ajay Mittal, Pearson Education

Suggested Reference Books

1. Brian W. Kernighan And Dennis M. Ritchie, The C Programming Language, Prentice Hall Of India
2. Introduction To C Programming, Reema Thareja, Oxford University Press
3. E. Balaguruswamy, Programming In Ansi C, Tata Mcgraw-Hill

COURSE OUTCOMES

The student will

1. Have the ability to **describe** a formal algorithmic solution for the given problem, **list** the features of C including scalar & vector data types, operators, **Outline** expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.

2. Have the ability to **describe** one and two-dimensional arrays, **outline** loops and arrays for searching and **describe** various sorting techniques.

3. Have the ability to **outline** the purpose of functions, pointers, command line arguments, dynamic memory allocation. **Define** storage classes. **Describe** command like arguments, structures, unions, and enumeration. Have knowledge of handling files.

4. Have the ability to **solve** complex expressions, **design** algorithms and **develop** programs in C language using the basic constructs, data types, operators, control & iterative statements, and arrays.

5. Have the ability to **apply** arrays to solve complex matrix related problems and strings. **Compare and contrast** various searching and sorting techniques for complexity.
6. Have the ability to **distinguish between** function call types. **Draw inferences on** command line arguments, storage classes, and pre-processor directives. **Use** pointers with functions, arrays, strings, to **solve** complex problems. **Give example** and **solve** classical recursion problems**. Compare and contrast** static and dynamic memory allocation, and **apply** them. **Use** structures and unions to implement and **solve** real-time problems. **Apply** file related functions to process files.

7. Have the ability to **Fully appreciate** the art of procedural programming in C and develop programs **optimally** using the full feature set of C language.

Course Title:	Programming for problem solving (Common to ALL Branches)														
Course Code:	A2CIT201														
Course Designed by	Dept. of Computer Science and Engineering														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSOM	PSON	PSOO
CO1	3	3						3	2	1		2	1	1	1
CO2	3	3						3	2	1		2	1	1	1
CO3	3	3						3	2	1		2	1	1	1
CO4	3	3	3	3	3	3	3	3	2	1	1	2	3	3	3
CO5	3	3	3	3	3	3	3	3	2	1	1	2	3	3	3
CO6	3	3	3	3	3	3	3	3	3	1	1	2	3	3	3
CO7	3	3	3	3	3	3	3	3	3	1	1	3	3	3	3

Levels of Correlation: High-3, Medium-2, Low-1

PROGRAMMING FOR PROBLEM SOLVING PRACTICE

COURSE OBJECTIVES	
1.	To use basic data types, operators, expressions and expression evaluation mechanisms using C Programming Language.
2.	To implement control flows construct in C Programming Language and understand the syntax, semantics and usability contexts of these different construct.
3.	To develop composite data types in C and constructs available to develop their data-types, utilize them to model things and dealing with data from and to external files.
4.	To design programs with different variations of the constructs available for practicing modular programming and understand the pros and cons of using different variants and apply optimization.

UNIT – I

WEEK 1:

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using computers
Lab1: Familiarization with programming environment

i) Exposure to Turbo C, gcc, Code Blocks IDE
ii) Writing simple programs using printf(), scanf()

WEEK 2:

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments/Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts
Lab1: Converting algorithms/flowcharts into C Source code

Developing the algorithms/flowcharts for the following sample programs

i. Sum and average of 3 numbers
ii. Conversion of Fahrenheit to Celsius and vice versa
iii. Simple interest calculation

WEEK 3:

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:
Lab 3: Simple computational problems using arithmetic expressions

i) Finding the square root of a given number
ii) Finding compound interest
iii) Area of a triangle using heron's formulae
iv) Distance travelled by an object

UNIT – II

WEEK 4:

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and their precedence and associativity:
Lab 4: Simple computational problems using the operator's precedence and associativity

i) Evaluate the following expressions
   a. A+B*C+(D*E)+F*G
   b. A/B*C-B+A*D/3
ii) a. A+++B---A
   b. J=(i++)+(++i)
iii) Find the maximum of three numbers using conditional operator
iv) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5:

Objective: Explore the full scope of different variants of "if construct" namely if-else, null-else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures

i) Write a C program to find the max and min of four numbers using if-else
ii) Write a C program to generate electricity bill
iii) Find the roots of the quadratic equation
iv) Write a C program to simulate a calculator using switch case
v) Write a C program to find the given year is a leap year or not

WEEK 6:

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops:
Lab 6: Iterative problems e.g., the sum of series

i) Find the factorial of given number using any loop
ii) Find the given number is a prime or not
iii) Compute sine and cos series
iv) Checking a number palindrome
v) Construct a pyramid of numbers

UNIT – III

WEEK 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1D Arrays: searching
Lab 7: 1D Array manipulation, linear search

i) Find the min and max of a 1-D integer array
ii) Perform linear search on1D array
iii) The reverse of a 1D integer array
iv) Find 2's complement of the given binary number
v) Eliminate duplicate elements in an array

WEEK 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2D arrays, Sorting and Strings
Lab 8: Matrix problems, String operations, Bubble sort

i) Addition of two matrices
ii) Multiplication two matrices
iii) Sort array elements using bubble sort
iv) Concatenate two strings without built-in functions
v) Reverse a string using built-in and without built-in string functions

UNIT-IV

WEEK 9:

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 9: Functions, call by value, scope and extent,
Lab 9: Simple functions using call by value, Solving differential equations using Eulers theorem

i) Write a C function to calculate NCR value
ii) Write a C function to find the length of a string
iii) Write a C function to transpose of a matrix
iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 10:

Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 10: Recursion, the structure of recursive calls

Lab 10: Recursive functions

i) Write a recursive function to generate Fibonacci series
ii) Write a recursive function to find the lcm of two numbers
iii) Write a recursive function to find the factorial of a number
iv) Write a C Program to implement Ackermann function using recursion
v) Write a recursive function to find the sum of series.

WEEK 11:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 11: Call by reference, dangling pointers
Lab 11: Simple functions using Call by reference, Dangling pointers

i) Write a C program to swap two numbers using call by reference
ii) Demonstrate Dangling pointer problem using a C program
iii) Write a C program to copy one string into another using pointer
iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

UNIT – V

WEEK 12:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc(), calloc(), realloc() and free() functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 12: Pointers, structures and dynamic memory allocation
Lab 12: Pointers and structures, memory dereference

i) Write a C program to find the sum of a 1D array using malloc()
ii) Write a C program to find the total, average of n students using structures
iii) Enter n students data using calloc() and display failed students list
iv) Read student name and marks from the command line and display the student details along with the total.
v) Write a C program to implement realloc()

WEEK 13:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly-linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 12: Bitfields**,** Self-Referential Structures, Linked lists
Lab 12: Bitfields, linked lists

i) Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit-fields
ii) Create and display a singly linked list using self-referential structure
iii) Demonstrate the differences between structures and unions using a C program
iv) Write a C program to shift/rotate using bitfields
v) Write a C program to copy one structure variable to another structure of the same type.

WEEK 14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling:
Lab 14: File operations

i) Write a C program to write and read text into a file
ii) Write a C program to write and read text into a binary file using fread() and fwrite()
iii) Copy the contents of one file to another file
iv) Write a C program to merge two files into the third file using command-line arguments
v) Find no. of lines, words and characters in a file
vi) Write a C program to print last n characters of a given file.

TEXTBOOKS:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

REFERENCES:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India
2. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

COURSE OUTCOMES

CO1.	**Demonstrate** the ability to write a formal algorithmic solution for the given problem, **name & explain** the features of C like types including scalar & vector types, operators, expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.
CO2.	**Implement** one and two-dimensional arrays to solve simple mathematical and matrix related problems. **Make use of** loops and arrays for searching and **Compare** various sorting techniques.
CO3.	**Identify** the purpose of functions, pointers, command line arguments, dynamic memory allocation. **Define** storage classes. **Understand** command like arguments, structures and unions. Have **knowledge** of handling files.
CO4.	**Design** algorithms and **develop** programs in C language using the basic constructs, data types, operators, control statements, and arrays.
CO5	**Apply** pointers, functions, derived data types, and dynamic memory allocation, **design** solutions to challenging problems.
CO6	**Illustrate** the art of procedural programming in C and **develop** programs optimally using the full feature set of C language.

Course Title:	Programming for problem solving lab (Common to ALL Branches)
Course Code:	A2CII201
Course Designed by	Dept. of CSE & IT

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2	3	1	1	1	2	2			2	2	2
CO2	3	3	1	2	3	1	1	1	2	2			2	2	2
CO3	3	3	2	3	3	2	1	1	2	2			3	3	3
CO4	3	3	2	3	3	3	1	1	2	2			3	3	3
CO5	3	3	3	3	3	3	1	1	2	2			3	3	3
CO6	3	3	3	3	3	3	1	1	3	3	3		3	3	3

Levels of Correlation: High-3, Medium-2, Low-1

Course designed by	DEPARTMENTS OF CSE & IT
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019

A2MED201	SEMESTER - I	L	T	P	C
	COMPUTER AIDED ENGINEERING GRAPHICS	1	-	3	3
	Total Contact Hours – 60				

SYLLABUS

UNIT-I

Overview of Computer Graphics:

Computer technologies that impact on graphical communication, Demonstrating knowledge of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line, The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.

Set up of the drawing page and the printer, Scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing.

Applying dimensions to objects, applying annotations to drawings;

UNIT-II

Layers: Setting up and use of Layers, layers to create drawings, create, edit and use customized layers, concept of view ports.

Introduction to Orthographic Projections: Projections of Points; Projections of Straight Lines parallel to both planes; Projections of Straight Lines-Parallel to one and inclined to other plane.

UNIT-III

Projections of Straight Lines and Planes: Lines inclined to both planes, determination of true lengths, angle of inclinations and traces, Projections of Planes

UNIT-IV

Projections and sections of solids: Projections of simple solids- Sections of solids

UNIT -V

Development of surfaces, Isometric Projection and Conversion of Isometric Views to Orthographic Views: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa

TEXT BOOKS

1. DM Kulkarni, AP Rastogi, AK Sarkar "Engineering graphics with Auto CAD" PHI Publishers
2. Bhatt N.D., Panchal V.M. & Ingle P.R "Engineering Drawing" Charotar Publishing House.

REFERENCE BOOKS

1. Shah, M.B. & Rana B.C "Engineering Drawing and Computer Graphics", Pearson Education.
2. Agrawal B. & Agrawal C. M "Engineering Graphics", TMH Publication.
3. Narayana, K.L. & P Kannaiah "Engineering Drawing", SciTech Publishers.
4. CAD Software Theory and User Manuals.

COURSE OUTCOMES

At the end of the course the students will be able to:

CO1: Prepare two dimensional drawings using draw and modify commands in Auto CAD software and represent dimensions to the drawings

CO2: Clearly differentiate different types of projections and get solutions to projections of points in Auto CAD by applying the layers concept

CO3: Solve problems related to projections of straight lines and planes

CO4: Prepare simple solids in CAD software and obtain solutions to projections and sections of solids

CO5: Develop the surfaces of simple solids, prepare Isometric drawings and convert isometric drawings into orthographic views

CO/PO Mapping

Course Title:	Computer Aided Engineering Graphics													
Course Code:	A2MED201													
Course Designed by	Dept. of Mechanical Engineering													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2		3	1		1	2	3	2	2	3	2
CO2	3	2	2		3	1		1	2	3			2	1
CO3	3	2	2		3	1		1	2	3			2	1
CO4	3	2	3		3	1		1	2	3	2	2	3	1
CO5	3	2	3		3	1		1	2	3	2	2	3	1

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

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A2EHA701	SEMESTER - I	L	T	P	C
	CONSTITUTION OF INDIA	2	-	-	0
	Total Contact Hours – 30				

SYLLABUS

UNIT – I: HISTORY OF MAKING OF THE INDIAN CONSTITUTION

History - Drafting Committee, (Composition & Working)

UNIT – II: PHILOSOPHY OF THE INDIAN CONSTITUTION: Preamble - Salient Features

UNIT-III: CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES: Fundamental Rights -Right to Equality -Right to Freedom -Right against Exploitation -Right to Freedom of Religion -Cultural and Educational Rights -Right to Constitutional Remedies ; Directive Principles of State Policy ; Fundamental Duties.

UNIT-IV: ORGANS OF GOVERNANCE: Parliament -Composition - Qualifications and Disqualifications - Powers and Functions - Executive - President - Governor - Council of Ministers; Judiciary, Appointment and Transfer of Judges, Qualifications.

UNIT – V: LOCAL ADMINISTRATION: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayati raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat : Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

TEXT BOOK:
Reference Source compilation

REFERENCES:
1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.

COURSE OUTCOMES:

CO1. Students will be able to discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.

CO2. Students will be able discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.

CO3. Students will be able to discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP]under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.

CO4. Students will be able to discuss the passage of the Hindu Code Bill of 1956.

CO5. Students will be able to discuss the powers of Executive, Judiciary and Legislature.

CO/PO Mapping

Course Title:	Constitution of India (Common to ALL Branches)
Course Code:	A2EHA701
Course Designed by	Dept. of English & Humanities

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2								
CO2						2								
CO3						2								
CO4						2								
CO5						2								

Course designed by	DEPARTMENT OF ENGLISH & HUMANITIES
Approval	Approved by: Meeting of Board of Studies held on 23.06.15
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

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A2MAT103	SEMESTER - II	L	T	P	C
	MATHEMATICS-II (CSE & IT)	3	0	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: RANDOM VARIABLES & PROBABILITY DISTRIBUTIONS

Random Variables: Discrete and continuous random variables, properties of mass and density functions. Mathematical Expectation: Properties (statements), Moment Generating Function; Outlines: of Binomial and Poission distributions; Normal Distribution: Probability density function, Normal approximation to Binomial Distribution, Parameters of Normal Distribution(statements), Characteristics of normal distribution, Area under normal curve, Standard normal distribution.

UNIT- II: STATISTICAL METHODS

Curve fitting by least squares method: Bi-variate data, scatter diagram, method of least squares, normal equations, fitting of straight line, second degree curve (parabola), exponential and power curves; Correlation: types of correlation, measures of correlation, Karl Pearson coefficient of correlation and its properties; Regression Analysis: Regression Coefficients and its Properties, Regression lines.

UNIT-III: SAMPLING DISTRIBUTIONS AND TESTING OF HYPOTHESIS (LARGE SAMPLES)

Sampling distributions: population, sample, population parameters, sample statistic and types of sampling, sampling distribution of means (with and without replacement), standard error, Testing of hypothesis (large samples): Statistical hypothesis, null hypothesis, alternative hypothesis, type-I and type-II errors, critical region, level of significance, one tailed and two tailed tests.

Large Sample tests: Z-test for single mean and difference of means, single proportion and difference of proportions.

UNIT-IV: TESTING OF HYPOTHESIS (SMALL SAMPLES)

Testing of hypothesis (small samples): Introduction to small sample tests, degrees of freedom, Student's t, F and Chi-square distributions; student's t-test: t-test for single mean, difference of means and paired t-test; Chi-square test: Goodness of fit, independence of attributes, F-test: equality of population variances.

UNIT-V: QUEUING THEORY

Introduction to Queuing Models: Introduction to stochastic process, states space, Markovian's property, Input pattern, service pattern, queue discipline, Queue behavior, Kendal's notation, Pure Birth and Death Models, Traffic intensity; (M/M/1: ∞/FIFO)-Model: Average System length, Average queue length , Average waiting time and related probabilities; (M/M/: N/FIFO)-Model: Average system length, average queue length, average waiting time and related probabilities.

//Topics prefixed with 'outlines / overview' are not for assessment//

TEXT BOOKS:

1. RE Walpole, SL Mayeres & K May, Probability and Statistics for Engineers & Scientists, 3/e, Pearson Publishers
2. T.K.V. Iyengar et al, Probability and Statistics, S. Chand Publications, Revised edition.

REFERENCE BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017
2. Murugesan and Gurusamy, Probability, Statistics and Random Process, Anuradha Publicatons.
3. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

COURSE OUTCOMES:

At the end of course, students shall be able to:

CO 1 Recall the concepts of random variables, probability distributions and statistical methods.

CO 2 Recall the concepts of Sampling distributions and testing of hypothesis (large samples).

CO 3 Recall the concepts of testing of hypothesis (small samples), stochastic processes and queuing models.

CO 4 Understand and interpret the concepts of random variables, probability distributions and statistical methods.

CO 5 Understand and interpret the concepts of Sampling distributions and testing of hypothesis (large samples).

CO 6 Understand and interpret the concepts of testing of hypothesis (small samples), stochastic processes and queuing models.

CO 7 Apply the tools of probability and statistics to real world problems.

CO/PO Mapping

Course Title:	MATHEMATICS-II (CSE & IT)													
Course Code:	A2MAT103													
Course Designed by	Dept. of Mathematics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2							2			
CO2	3	3		2							2			
CO3	3	3		2							2			
CO4	3	3		2							2			
CO5	3	3		2							2			
CO6	3	3		2							2			
CO7	3	3		2							2			

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 06.07.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CYI101	SEMESTER - II	L	T	P	C
	ENGINEERING CHEMISTRY (Common to all branches)	3	--	2	5
	Total Contact Hours – 48				

SYLLABUS

UNIT 1: WATER TECHNOLOGY

Introduction –Soft Water and hardness of water, Estimation of hardness by EDTA Method - Boiler troubles - Industrial water treatment – specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, zeolite and ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.

UNIT 2: POLYMERS

Introduction to polymers, functionality of monomers, addition and condensation polymerization, copolymerization, stereospecific polymerization with specific examples. Thermoplastics and Thermo-sets – their differences.

Elastomers – applications with specific examples- Preparation, properties and uses of PVC, Bakelite, Teflon and Nylon-6, 6, Buna-S and Thiokol rubber- Fibre reinforced plastics – carbon fibre, glass fibre and aramids.

UNIT 3: ELECTROCHEMISTRY AND APPLICATIONS

Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations.
Primary cells –dry cell- Secondary cells – lead acid, nickel-cadmium and lithium ion batteries- working of the batteries including cell reactions- Fuel cells, hydrogen-oxygen, and methanol fuel cells – working of the cells.
Corrosion: Introduction to corrosion, mechanism of dry and wet corrosion, Pilling Bedworth ratios and uses, Types of corrosion – Differential aeration corrosion, galvanic corrosion, pitting corrosion, waterline corrosion and stress corrosion, Factors affecting the rate of corrosion – metal based factors and environmental based factors, protection techniques – metal coatings – galvanization and tinning, cathodic protection, inhibitors – cathodic and anodic, organic coatings – paints – constituents and their functions.

UNIT-4: CHEMISTRY OF ADVANCED MATERIALS

NANOMATERIALS: introduction- synthesis of Nano material by sol gel method- CVD- engineering applications of Nano materials

CEMENT: Introduction to ordinary Portland cement- manufacturing of OPC- setting and hardening of cement- decay of cement.

FUELS: Introduction- classification- liquid fuels- cracking- knocking- octane number and cetane number; Lubricants- definition- mechanism and properties of lubricants

UNIT 5: INSTRUMENTAL METHODS AND APPLICATIONS

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle, instrumentation (Block diagram and working), applications of UV, IR and NMR

spectroscopic methods. Chromatography- introduction- Ion exchange chromatography- applications

COURSE OUTCOMES:

CO1: The student will have the ability to describe softening methods and desalination processes. He/ She will be able to explain various types of polymers; preparation, properties and engineering applications of thermoplastic, thermosetting plastics, rubbers and FRP's.

CO2: The student will have the ability to describe electrochemical reactions, principles of batteries, fuel cell and corrosion.

CO3: The student will have the ability to outline electromagnetic spectrum and explain the working principles of IR, UV, NMR and chromatographic techniques. The student describes the synthesis, properties and applications of nanomaterials, cement. HE/ She Outlines the cracking methods, knocking of fuels.

CO4: The student will have the ability to differentiate between hard and soft water, demineralization and deionization processes and thermosetting – thermoplastic materials.

CO5: The students will have the ability to give examples on primary and secondary batteries, various types of corrosion, methods of corrosion prevention.

CO6: The student will have the ability to draw inferences on the principles and applications of various instrumental methods and also can compare and contrast between cracking methods.

CO7: The student will have the ability to analyze water samples and validate the results obtained and apply their knowledge on polymers, batteries, materials and instrumentation.

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Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

Reference books:

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. H.Kaur, Instrumental Methods of chemical analysis, Pragathi Prakashan, 2012.
3. Chemistry for Engineers, Teh Fu Yen, Imperial college press, London

CO/PO Mapping

Course Title:	Engineering Chemistry													
Course Code:	A2CYI101													
Course Designed by	Dept. of Chemistry													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								2			1		
CO2	3								2			1		
CO3	3								2			1		
CO4	3								2			1		
CO5	3								2			1		
CO6	3								2			1		
CO7	3								2			1		

Course designed by	DEPARTMENT OF CHEMISTRY
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

Engineering Chemistry - Laboratory

List of Experiments:

1. Determination of HCl using sodium carbonate
2. Determination of Hardness of a groundwater sample.
3. pH metric titration of strong acid vs. strong base
4. Condcutometric titration of Strong acid VS Strong base
5. Condcutometric titration of Weak acid VS strong base
6. Potentiometric titration of Fe(II) with potassium dichromate
7. Determination of Strength of an acid in Pb-Acid battery
8. Preparation of a polymer
9. Determination of viscosity of polymer solution using survismeter
10. Determination of percentage of Iron in Cement sample by colorimetry
11. Estimation of Calcium oxide in port land Cement
12. Preparation of Nanomaterials (ex: Fe/ Zn/ Ferrite)
13. Adsorption of acetic acid by charcoal
14. Determination of acid value and saponification value of a given lubricant
15. Project based learning (Mandatory for all students)

Course Outcomes:

CO1: The student will be able to determine total hardness, strength of acid in a lead acid battery, calcium in Portland cement using volumetric analysis

CO2: The student will be able to explain condcutometric, potentiometric, pH metric titrations and colorimetric determination.

CO3: The student will be able to explain the synthesis of a polymer, nanomaterials

CO/PO Mapping

Course Title:	Engineering Chemistry													
Course Code:	A2CYI101													
Course Designed by	Dept. of Chemistry													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		1			1				1	1	2		
CO2	3		1			1				1	1	1		
CO3	3		1							1	1	1		

Course designed by	DEPARTMENT OF CHEMISTRY
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2EEI201	SEMESTER – II	L	T	P	C
	Basic Electrical Engineering **(Common to all braches)**	**3**	**1**	**2**	**5**
	Total Contact Hours – 50				

SYLLABUS

UNIT 1: D.C. CIRCUITS

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, Analysis of simple circuits with DC excitation, Superposition, Thevenin's and Norton's Theorems, Time-domain analysis of first-order RL and RC circuits.

UNIT 2: A.C. CIRCUITS

Representation of sinusoidal waveforms, Average and RMS values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase AC circuits (Series & Parallel), Resonance, Three-phase balanced circuits, voltage and current relations in star and delta configurations.

UNIT 3: DC & AC MACHINES [ELEMENTARY TREATMENT ONLY]

Principle and operation of DC Generator - EMF equation – open circuit characteristic of DC shunt generator – principle and operation of DC Motor – Types of DC Motors – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of single-phase Transformer - OC and SC tests on transformer - principle and operation of single phase & Three phase Induction Motors, construction and working of synchronous motors

UNIT 4: BASICS OF POWER SYSTEMS:

Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.

UNIT 5: ELECTRICAL INSTALLATIONS

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Types of Batteries, Characteristics of Batteries. Elementary calculations for energy consumption, power factor improvement, battery backup.

TEXT BOOK/ REFERENCES:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010
2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
3. Vincent Del Toro, "Electrical Engineering Fundamentals", Pearson, 2015.

COURSE OUTCOMES:

At the end of the course, Student will be able to

CO1. To recall fundamental concepts of electrical circuits such as charge, voltage, current and power.
CO2. Describe the principle of operation of D.C. & A.C. machines.
CO3. Outline the working operation of various generating stations.
CO4. Explain the procedure for solving circuits with A.C and D.C. Excitation
CO5. Summarize the performance characteristics of different machines.
CO6. Explain about different equipment used in power industry
CO7. Apply the fundamental laws, associated with Basic Electrical Engineering to solve real world problems in the field of Engineering

CO/PO Mapping

CO / PO mapping	Program Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
To recall fundamental concepts of electrical circuits such as charge, voltage, current and power.	3	3	1	1			3			1			1	1
Describe the principle of operation of D.C. & A.C. machines.	3	2	2	2	2					1			1	1
Outline the working operation of various generating stations.	3	3	3	1	1		1			1			1	1
Explain the procedure for solving circuits with A.C and D.C. Excitation	3	3	2	1	1		2			1			1	1
Summarize the performance characteristics of different machines.	3	3	2	1	1	3	1			1			1	1
Explain about different equipment used in power industry	3	3	2	1		2	2			1		1	3	2
Apply the fundamental laws, associated with Basic Electrical Engineering to solve real world problems in the field of Engineering	3	3	3	3	3	2	2			2		3	3	3

Course designed by	Department of Electrical & Electronics Engineering
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

Basic Electrical Engineering Laboratory

LIST OF EXPERIMENTS

Basic safety precautions, Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope, resistors, capacitors and inductors.

1. Verification of Kirchhoff laws.
2. Verification of Network Theorems.
3. Magnetization characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. Predetermination of performance parameters of 1 – Phase Transformer.
6. I – V Characteristics of Solar PV cell
7. Brake test on DC Shunt Motor.
8. Measurement of earth resistance.
9. Measurement of reactive power in three phase balanced circuit.
10. Measurement of Choke coil parameters
11. Brake test on 3 - Phase Induction Motor.
12. Determination of AC quantities using CRO/DSO.
13. I – V characteristics of battery.

COURSE OUTCOMES:

At the end of the course, Student will be able to

CO 1. Identify common electrical equipment used in laboratory.(L1)

CO 2. Estimate the ratings of different equipment used to perform an experiment. (L2)

CO 3. Demonstrate the usage of various electrical measuring instruments.(L3)

CO 4. Analyze the characteristics of rotating & stationery electrical machines (L4).

CO 5. Interpret the characteristics of PV cell and Battery.(L5)

CO/PO Mapping

CO / PO Mapping	Program Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
Identify common electrical equipment used in laboratory.	3		1	1	3	1			3	2	2	2	2	1
Estimate the ratings of different equipment used to perform an experiment.	3	2	3	3	3	2	1		3	3	2	2	2	3
Demonstrate the usage of various electrical measuring instruments.	2	2	2	2	3	1			3	3	1	2	2	1
Analyze the characteristics of rotating & stationery electrical machines.	3	3	3	3	2				3	3		2	3	2
Interpret the characteristics of PV cell and Battery.	3	3	3	3	3		1		3	3	2	2	3	3

Course designed by	Department of Electrical & Electronics Engineering
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2EHL001	SEMESTER - II	L	T	P	C
	Essential Communication in English	1	-	3	3
	Total Contact Hours – 60				

SYLLABUS

UNIT – I: BASIC LANGUAGE SKILLS – A REFRESHER

Organs of Speech: Consonant Sounds &Vowel Sounds; Phonemic Transcription; Using a Dictionary to know the Pronunciation of a word

Presenting Oneself: Introducing oneself -Using different expressions in Formal&Informal Contexts.

Reading a News Article: Identifying the key words and their usage; summarizing the information

Word Study & Mind Mapping: Root words–Derivatives; Homonyms, Homographs, Homophones; Synonyms & Antonyms

UNIT – II: RUDIMENTS OF FUNDAMENTAL COMMUNICATION

The World: Listening & watching Documentaries on World famous Places.

Describing People, Places and Life experiences: Physical Description- Describing someone's qualities – Usage of Jargon to present topography.

Short Story Corner: Reading a short story – Understanding the mood and essence – Sharing different perspectives.

Sentence Patterns: Concord – Rules – Common errors in day-day usage

UNIT-III: COMMUNICATION AT PRACTICE

Oratory Skills: Listening to World's Famous Speeches

JAM (Just a Minute) Talk: Format & Delivery Techniques

Nuances of Language: Company Description –Position Description (Formal) – processes like Chocolate Making(Informal)**.**

Types of Sentences – Declarative, Interrogative, Assertive etc.

UNIT-IV: COMMUNICATION THROUGH CONCEPTUAL LEARNING

BBC English: Watching interviews of Famous people.

Dialogue Practice: Situational Dialogues; Structuring a Role Play

New Inventions: Reading about latest technology pertaining to different fields (Source : Science Journals)

Transformation of sentences: Active Voice-Passive Voice**,** Direct & Indirect Speech**,** Degrees of Comparison**,** Simple Compound & Complex Sentences.

UNIT – V: COMMUNICATION THROUGH LIFE SKILLS

Watching Movies for Language Enrichment & Writing Reviews.

Skits: Enacting a Skit on a Social Issue

Reflections: Reading News Paper Editorial columns, Literacy Reviews, Poetry

Presenting an autobiography: Exploring different styles of writing autobiographies and evolving an own style**.**

TEXT BOOK:
Reference Source Compilation by the Department

REFERENCES:
1. **Fundamentals of Technical Communication** by Meenakshi Raman,OUP.
2. **Living English Structure** by W.Stannard Allen, Pearson Publications.
3. **English Made Easy** by Mary Margaret Hosler, Mc Graw Hill.
4.. **English and Communication Skills for Students of Science and Engineering**, by Dhanavel, S.P. Orient Blackswan Ltd.
5. **The Oxford Guide to Writing and Speaking** by John Seely , OUP

COURSE OUTCOMES:

CO1. Student will be able to come to terms with the basic language Skills required to cater to the requirement of the programme undertaken.

CO2. Student will be able to comprehend and analyze the core concepts well.

CO3. Student will be able to gain proficiency in all four skills of Language – Listening, Reading, Speaking and Writing.

CO4. Student will be able to understand the Syntactical and Grammatical Components of English Language and their correct use.

CO5: Student will be able to present his/her ideas confidently in a Professional manner.

CO/PO Mapping

Course Title:				**Essential Communication in English**										
Course Code:				A2EHL001										
Course Designed by				Dept. of English & Humanities										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2		2	3	3		3		
CO2						2		2	3	3		3		
CO3						2		2	3	3		3		
CO4						2		2	3	3		3		
CO5						2		2	3	3		3		

Course designed by	DEPARTMENT OF ENGLISH & HUMANITIES
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CIW201	SEMESTER - II	L	T	P	C
	BASIC IT TOOLS WORKSHOP	**0**	**0**	**3**	**2**
	Total Contact Hours – 56 Hours (14 Weeks)				
COURSE OBJECTIVES					
COBJ1.	To Introduce the internal parts of a computer, peripherals, I/O ports, connecting cables				
COBJ2.	To Teach basic command line interface commands on Linux				
COBJ3.	To Teach the usage of Internet for productivity and self-paced lifelong learning				
COBJ4.	To Introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spreadsheets and Presentation tools				

UNIT 1: COMPUTER HARDWARE

Types of Computing Devices such as PC, Laptops, Servers, Smart Phones, Tablets, other accessories, PC parts, Input/Output devices, I/O ports and interfaces, main memory, cache memory and secondary storage technologies, digital storage basics, networking components and speeds.

Unit Outcomes:

Student should be able to

1. Identify various kinds Computing devices and their components.
2. Identify the different peripherals, ports and connecting cables in a PC.
3. Assemble and disassemble components of a PC

References:

1. Introduction to computer-peter Norton
2. https://explorersposts.grc.nasa.gov/post631/2006-2007/computer_basics/ComputerPorts.doc
3. https://explorersposts.grc.nasa.gov/post631/2006-2007/bitsnbyte/Digital_Storage_Basics.doc

UNIT 2: OPERATING SYSTEMS

Virtual Machine setup:

- Setting up and configuring a new Virtual Machine
- Setting up and configuring an existing Virtual Machine
- Exporting and packaging an existing Virtual Machine into a portable format

Operating System installation:

- Installing an Operating System such as Linux on Computer hardware.

Linux Operating System commands:

- General command syntax
- Basic *help* commands: whatis, man, info
- Filesystem: ls, mkdir, cd, touch, chmod, rm, mv, bc, finger, who, whoami, ps, du, df
- Date and Time: cal, date,
- Filters and Text processing: echo, cat, tac, rev, more, less, head, tail, nl, cut, paste, wc, sort, uniq, cp, cmp, diff, tr, ln, grep, fgrep, egrep, sed, awk, find, xargs, tee,

- File compression: tar, compress, uncompress, split, uuencode, uudecode, gzip, gunzip, read, expr, test, ping, ssh
- Miscellaneous: apt-get, vi editor
- Shell I/O redirection and piping, regular expressions, simple shell programs without control structures.
- Search for "20 examples of grep in linux" and practice like this on all the given commands.

https://www.thegeekstuff.com/2009/07/linux-ls-command-examples
https://www.pcsuggest.com/basic-linux-commands/
https://www.linuxtechi.com/25-find-command-examples-for-linux-beginners/

Unit Outcomes:

Student should be able to:

1. construct a fully functional virtual machine
2. summarize various linux operating system commands

References:

1. https://www.vmware.com/pdf/VMwarePlayerManual10.pdf
2. https://zorinos.com/help/
3. https://zorinos.com/help/install-zorin-os/
4. https://geek-university.com/vmware-player/manually-install-a-guest-operating-system/
5. https://clearlinux.org/documentation/clear-linux/get-started/virtual-machine-install/vmw-player-preconf
6. https://www.thegeekstuff.com/2009/07/linux-ls-command-examples
7. https://www.pcsuggest.com/basic-linux-commands/
8. https://www.linuxtechi.com/25-find-command-examples-for-linux-beginners/

UNIT 3: NETWORKING AND INTERNET

Networking Commands :

- ping, ssh, ifconfig, scp, netstat, ipstat, nslookup, traceroute, telnet, host, ftp, arp, wget,route

Internet Services:

- Web Browser usage and advanced settings like LAN, proxy, content, privacy, security, cookies, extensions/plugins
- Antivirus installation, configuring a firewall, blocking pop-ups
- Google search techniques(text based, voice based)
- alexa website traffic statistics
- Email creation and usage
- google hangout/skype/gotomeeting video conferencing
- archive.org for accessing archived resources on the web
- Creating a Digital Profile on LinkedIn, Twitter, Github

Unit Outcomes:

Students should be able to

1. resolve internet connectivity issues
2. secure a computer from cyber threats
3. apply google search techniques
4. create their own digital profile on social media

References:

1. http://www.googleguide.com/advanced_operators_reference.html
2. https://www.alexa.com/find-similar-sites
3. https://www.alexa.com/topsites examine links Global, By Country and By Category
4. Use https://archive.org/ to locate missing links in other sites.

UNIT 4: PRODUCTIVITY TOOLS

Productivity Tools:

- archival and compression tools
- scanning and image editing tools
- photography with digital camera and photo editing tools
- OCR and text extraction
- audio players, recording using Mic, editing, podcast preparation
- video players, recording using webcam/camcorder, editing
- podcast, screencast, vodcast, webcasting

Unit Outcomes:

Students should be able to:

1. archive and unarchive data on the file system using relevant compression tools
2. edit photos & images in various formats using photo & image editing tools
3. recognize characters & extract text from scanned images
4. create audio files and podcasts
5. create video tutorials and publishing

References:

1. File Archivers: https://en.wikipedia.org/wiki/File_archiver .
   Comparison of file archivers:
   https://en.wikipedia.org/wiki/Comparison_of_file_archivers
2. Image editing: https://en.wikipedia.org/wiki/Image_editing
   Comparison of raster graphics editors:
   https://en.wikipedia.org/wiki/Comparison_of_raster_graphics_editors
3. Optical Character Recognition:
   https://en.wikipedia.org/wiki/Optical_character_recognition
4. Audio editing software: https://en.wikipedia.org/wiki/Audio_editing_software
   Comparison of free software for audio:
   https://en.wikipedia.org/wiki/Comparison_of_free_software_for_audio
5. Video editing software: https://en.wikipedia.org/wiki/Video_editing_software
   Comparison of video editing software:
   https://en.wikipedia.org/wiki/Comparison_of_video_editing_software
6. Podcast: https://en.wikipedia.org/wiki/Podcast, Screencast:
   https://en.wikipedia.org/wiki/Screencast, Webcast:
   https://en.wikipedia.org/wiki/Webcast

UNIT 5: OFFICE TOOLS

Cloud based productivity enhancement and collaboration tools:

- Store, sync, and share files with ease in the cloud
    - Google Drive
- Document creation and editing text documents in your web browser
    - Google docs
- Handle task lists, create project plans, analyze data with charts and filters
    - Google Sheets

- Create pitch decks, project presentations, training modules
    - Google Slides
- Manage event registrations, create quizzes, analyze responses
    - Google Forms
- Build public sites, internal project hubs
    - Google Sites
- Web-based service providing detailed information about geographical regions and sites around the world. Explore the globe by entering addresses and coordinates
    - Google Maps and Earth
- Online collaboration through cross-platform support
    - Jamboard
- Keep track of important events, sharing one's schedule, and create multiple calendars.
    - Google Calendar

Unit Outcomes:
Students should be able to:

1. use office tools for documentation
2. build interactive presentations
3. navigate through the globe
4. build websites
5. create quizzes & analyze responses

References:

1. Cloud computing, productivity and collaboration tools, software and products offered by Google:https://en.wikipedia.org/wiki/G_Suite,
2. G Suite Learning Center: https://gsuite.google.com/learning-center/products/#!/

COURSE OUTCOMES

Students should be able to

1. Identify various computing devices and functional parts of a PC by assembly and disassembly
2. Construct a functional virtual machine and summarize various Linux operating system commands
3. List various networking commands and secure an individual PC or a network from cyber threats
4. Apply Google search techniques, create their own digital profile on social media
5. Edit Multimedia using various tools for image, audio and video processing
6. Use office tools for documentation and building interactive presentations
7. Use social networking for information gathering and online collaboration

CO/PO Mapping

Course Title:	**BASIC IT TOOLS WORKSHOP (CSE&IT)**
Course Code:	**A2CIW201**
Course Designed by	Dept. of CSE & IT

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO2
CO1	2				3						3		3
CO2	2	3			3						3		3
CO3			3		2						3		2
CO4						2				3	3		2
CO5	2				2						3		2
CO6							3		2		3		
CO7			2			3	3	3	3	2	3	3	

Course designed by	DEPARTMENTS OF CSE & IT
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019.
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

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B.Tech(Chemical)

MAHARAJ VIJAYARAM GAPATHI RAJ COLLEGE OF ENGINEERING(AUTONOMOUS)
Vijayaram Nagar Campus, Chintalavalasa, Vizianagaram-535005, Andhra Pradesh
Accredited by NAAC with 'A' Grade & Listed u/s 2(f) & 12(B) of UGC
(Approved by AICTE, New Delhi and Permanently Affiliated by JNTUK-Kakinada)
NBA Accredited UG Courses: B.Tech(MEC), B.Tech(CIV), B.Tech(EEE), B.Tech(ECE), B.Tech(CSE), B.Tech(IT), B.Tech(MEC) & B.Tech(CHE) and PG Course: MBA

ACADEMIC REGULATIONS & CURRICULUM

Applicable to the students admitted from the Academic Year 2019-2020

CHEMICAL ENGINEERING

(B.Tech. Programme)

MAHARAJ VIJAYARAM GAJAPATHI RAJ COLLEGE OF ENGINEERING

(Autonomous)

(Approved by AICTE, New Delhi, and permanently affiliated to JNTUK, Kakinada)

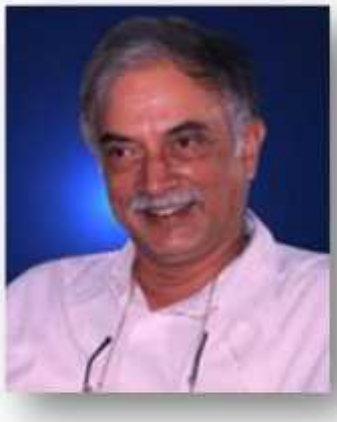
Listed u/s 2(f) & 12(B) of UGC Act 1956.

Vijayaram Nagar Campus, Chintalavalasa,Vizianagaram-535005, Andhra Pradesh

The visionaries

Late Dr. P V G Raju
Raja Saheb of Vizianagaram
Founder Chairman-MANSAS
Ex-Minister for Education and Health, Govt. of AP
Ex Member of Parliament

Late Dr. P. Anand Gajapathi Raju
Ex-Chairman-MANSAS
Ex-Minister for Education and Health
Govt. of AP
Ex Member of Parliament



P. Ashok Gajapathi Raju
Chairman-MANSAS
Ex-Union Minister for Civil Aviation,
Govt. of India
Ex-Minister for Finance, Govt. of AP

Vision

Maharaj Vijayaram Gajapathi Raj College of Engineering strives to become a centre par excellence for technical education where aspiring students can be transformed into skilled and well-rounded professionals with strong understanding of fundamentals, a flair for responsible innovation in engineering practical solutions applying the fundamentals, and confidence and poise to meet the challenges in their chosen professional spheres.

Mission

The management believes imparting quality education in an atmosphere that motivates learning as a social obligation which we owe to the students, their parents/guardians and society at large and hence the effort is to leave no stone unturned in providing the same with all sincerity. Towards that end, the management believes special focus has to be on the following areas:

M1: Have on-board staff with high quality experience and continuously updating themselves with latest research developments and sharing that knowledge with students.

M2: Having a well stream-lined teaching learning process that is continuously assessed for effectiveness and fine-tuned for improvement.

M3: Having state-of-the-art lab and general infrastructure that gives students the necessary tools and means to enhance their knowledge and understanding.

M4: Having a centralized department focused on improving placement opportunities for our students directly on campus and coordinating the training programs for students to complement the curriculum and enhance their career opportunities.

M5: Having advanced research facilities and more importantly atmosphere to encourage students to pursue self-learning on advanced topics and conduct research.

ABOUT THE INSTITUTION:

Maharajah Alak Narayan Society of Arts and Science (MANSAS) is an Educational Trust founded by Dr. (late) P.V.G Raju, Raja Saheb of Vizianagaram in the hallowed memory of his father Maharajah Alak Narayan Gajapati with a view to confound socio-economic inequalities in the Vizianagaram principality executing a trust deed on 12-11-1958 duly established Maharajah's College and other educational institutions in and around Vizianagaram. The Trust is a charitable one published under Section 6 a (1) of A.P Charitable and Hindu Religious Institutions and Endowment Act 30 of 1987.

The object of the Trust is to manage the properties of educational institutions under it and to promote and advance the cause of education in general, besides awarding scholarships to deserving students enabling them to undergo special training in science and industries in and out of India. The Trust has made an uncompromising contribution to the nation by presenting the stalwarts.

Trust offers KG to PhD level education in Arts, Sciences, Law, Pharmacy, Humanities Education, Engineering and Management and presently houses 13 Educational Institutions. MVGR College of Engineering is one of the 13 Institutes.

Other Institutions under MANSAS

1. M.R. HIGH SCHOOL 1857
2. M.R COLLEGE **(NAAC ACCREDITED)** 1879
3. M.R. COLLEGE OF EDUCATION 1950
4. M.R. WOMENS COLLEGE **(NAAC ACCREDITED)** 1962
5. M.R. GIRLS HIGH SCHOOL 1974
6. M.R. MODEL HIGH SCHOOL 1974
7. M.R. ENGLISH MEDIUM SCHOOL 1979
8. M.R.V.R.G.R LAW COLLEGE 1987
9. M.R. P.G. COLLEGE **(NAAC ACCREDITED)** 1987
10. M.R.SCHOOL OF MANAGEMENT STUDIES 1994
11. M.R.V.R.G.R – II MEMORIAL JR. COLLEGE 1994
12. M.R. COLLEGE OF PHARMACY 2004

Maharaj Vijayaram Gajapathi Raj (MVGR) College of Engineering was established in the year 1997 by Maharaj Alak Narayan Society for Arts and Sciences (MANSAS) to impart quality technical education. The Institution is located in lush green, serene and pollution free environment spread over 60 acres of land in Chintalavalasa village situated in the outskirts of Vizianagaram, a fort city in the north coastal region of Andhra Pradesh.

Institution at a glance:

- MVGR is a 22 years old institution, established in 1997
- All eligible UG Programs (CHEMICAL, CIV, CSE, ECE, EEE, IT & MECHANICAL) were reaccredited by NBA.
- MBA program was also re-accredited by NBA.
- Had been re-accredited with Grade 'A' by NAAC of UGC
- Has Permanent affiliation with JN Technological University-Kakinada
- Listed under sections 2(f) & 12(b) of UGC act 1956.
- Approved by AICTE-New Delhi
- EIGHT departments are recognized as RESEARCH CENTERS by JNTU-K
- Granted Autonomy by UGC in 2015
- Campus of 60 acre
- Offering 7 UG and 5 M.Tech., and 1 MBA program
- About 250 faculty of which 84 Ph.D. Degree holders
- 83 Laboratories with an investment of about 13 Crores
- Total built up area of about 7 Lakh Sft
- About 42,000 volumes and Access to 8 international online journal packages like IEEE, SPRINGER, etc.
- 1420 Systems & 395 Mbps band width internet facility
- About Rs. 4 Crore worth of on-going R&D projects
- Actively involved in civil engineering consultancy work as Third Party Quality Auditor for Vizianagaram Municipality
- WIPRO Recognized technology learning center and MISSION 10X partner institution
- Recognized National Instruments Academy for Training in LabView
- SIRO Recognition by DSIR
- Recognized PTC Centre of Excellence for Creo Training
- Identified by MSME as Business Incubation Centre
- APSSDC-Siemens Technical Skill Development Institute
- Recognized CMs SKILL EXCELLENCY CENTER (SEC)
- Microsoft Ed-vantage Platinum Partner
- Institutional member of IUCEE
- Institutional Member of CII
- Member, Chamber of Commerce, Vizianagaram
- Green Campus award by Govt. of AP

MVGR College of Engineering is rated as one among the best engineering colleges in the state of Andhra Pradesh as it set up highest standards in all areas of curricular, co-curricular and extra-curricular activities and in students' placements. Based on industry and expert's feedback, the college is updating the curriculum from time to time. The college offers many value added add-on courses students and conducts training programs to meet the industries' requirements.

Academic Regulations for B.Tech., Program

Applicable to the students admitted from the Academic year 2019-2020 onwards.

1. PROGRAM STRUCTURE:

B.Tech.:

Sl. No	Category	Credits
1	Humanities and Social Sciences including Management courses	12
2	Basic Science courses	25
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	26
4	Professional core courses	54
5	Professional Elective courses relevant to chosen specialization/branch	18
6	Open subjects – Electives from other technical and /or emerging subjects	12
7	Project work, seminar and internship in industry or elsewhere	13
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	0
	Total	160

- Open electives offered by the parent department are listed in the course structure and are offered to students of other programs. The students of parent departments may also opt the course, provided it shall not be listed in the curriculum.
- For audit course a student is deemed to satisfy the minimum contact hours, as prescribed by the department and shall also comply with the requirements for submission of assignments/projects. A student shall also opt for MOOCs and submit the certificate.

1. HSS Courses		
Sl. No.	Subject	Credits
1	English -1	3
2	English -2 (Technical English)	3
3	Elective-1 (Management Related course (MEFA or MS or Operations Research)	3
4	Elective-2 (Professional Ethics and Human Values)	3
	Total	**12**

2. Basic Science Courses		
Sl. No.	Subject	Credits
1	Mathematics-I	3
2	Mathematics-II	3
3	Mathematics-III	3
4	Mathematics-IV	3
5	Applied / Engineering Physics (Theory + Lab)	5
6	Engineering Chemistry (Theory + Lab)	5
7	Biology for Engineers	3
	Total	**25**

3. Engineering Science Courses		
Sl. No.	Subject	Credits
1	Programming for Problem Solving (Theory + Lab)	5
2	Internet of Things (IOT)	3
3	Computer aided Engineering Graphics	3
4	Basic Electrical Engineering (Theory + Lab)	5
5	Department wise Engineering Science Course-I (AI Tools , Techniques & Applications)	5
6	Department wise Engineering Science Course-II (Design thinking and Product Innovation)	3
7	Workshop (Department Specific)	**2**
	Total	**26**

	Subjects	Credits
4	**Professional Core Courses**	54
5	**Professional Elective Courses Relevant to Chosen Specialization/Branch**	18
6	**Open Subjects – Electives from other Technical and / or Emerging Subjects**	12
		84

7. Project		
Sl. No.	Subject	Credits
1	Socially Relevant Project	1
2	Mini Project	2
3	Project Phase - I	2
4	Project Phase - II	8
	Total	**13**

8. Audit Courses (Non Credit Course)		
Sl. No.	Subject	
1	Induction Program	
2	Constitution of India	
3	Indian Traditional Knowledge	
4	Environmental Science	

BOS Chairman shall notify the list of MOOCs offered (Open Elective & Professional Elective) in the beginning of the semester.

2. PROGRAM PATTERN:

B.Tech.: The program is for 4 academic years / 8 semesters.

B.Tech. (Lateral Entry): The program is for 3 academic years / 6 semesters.

3. AWARD OF DEGREE:

B.TECH:

A student will be declared eligible for the award of degree if he/she fulfills the following academic regulations.

a) A student shall be declared eligible for the award of degree, if he/she pursues a course of study for not less than four academic years and not more than eight academic years from the date of admission.

b) The student shall register for **160** credits and secure all **160** credits.

c) A student shall also register and successfully complete audit programs (Non-credit) as recommended by Academic Council.

d) A student on completing 1st year class work may opt for a break of 1 year which shall be deemed as GAP year, as recommended by APSCHE, for undertaking successful entrepreneurial ventures.

e) Students who fail to complete Four Years Course of study within 8 years shall forfeit their seat and their admission shall stand cancelled.

B.TECH (Lateral Entry):

A student will be declared eligible for the award of degree on fulfilling the following academic requirements.

a) A student shall be declared eligible for the award of the degree, if he/she pursues a course of study for not less than three academic years and not more than six academic years.

b) The student shall register for **126** credits and secure all **126** credits.

c) A student shall also register and successfully complete audit programs (Non-credit) as recommended by Academic Council.

d) Students who fail to complete their three Years Course of study within 6 years shall forfeit their seat and their admission shall stand cancelled.

e) Student shall register for bridge programs, if any, as administered by the respective departments at the beginning of 2nd year and successfully complete as per the guidelines of the Institution.

4. CERTIFICATION PROGRAMS:

Sl. No.	Dept.	Name of the Program
1	MECH	Windchill 10.2 PDM by Adroitec Engineering Solutions Pvt. Ltd., Hyderabad
2	MECH	Creo 2.0 by PTC
3	MECH	Edgecam by Verosoft, UK
4	MECH	ANSYS Training and Certification by Mechanical Department
5	MECH	AUTOCAD Training and Certification by Mechanical Department
6	MECH	Catia by APSSDC-Dassault Systems, CM's Center of Excellence
7	MECH	Delmia by APSSDC-Dassault Systems, CM's Center of Excellence
8	MECH	Simulia by APSSDC-Dassault Systems, CM's Center of Excellence
9	MECH	2-Wheeler Automobile Certification by APSSDC-SIEMENS
10	MECH	4-Wheeler Automobile Certification by APSSDC-SIEMENS
11	MECH	Welding Certification by APSSDC-SIEMENS
12	MECH	CNC Certification by APSSDC-SIEMENS
13	MECH	Commercial Electrical Certification by APSSDC-SIEMENS
14	MECH	Solid Edge Certification by APSSDC-SIEMENS
15	CHEM	Chemical Process Design and Simulation by Simtech Simulations, Hyderabad
16	ECE	Embedded Systems by Think LABS, Mumbai
17	ECE	Labview by National Instruments Systems India Pvt. Ltd.
18	ECE	Unified Technology Learning Program (UTLP) by Wipro Mission 10X
19	CSE, IT	PEGA by Virtusa Corporation
20	CSE, IT	Microsoft technologies by Microsoft Corp.
21	CSE, IT	Ethical Hacking by EC-Council Academia
22	CSE, IT	Java and C by Talent Sprint
23	CSE, IT	Network Analyst (CCNA) by Cisco Systems Inc
24	CSE, IT	Java Programming (OCJP) and DBMS by Oracle
25	EEE	PLC, Drives and Automation by Siemens
26	EEE	PLC by New Dawn Automation
27	EEE	Home Electrical Certification by APSSDC-SIEMENS
28	Civil	Remote Sensing and GIS by Indian Institute of Remote Sensing

a) The Institution shall offer the certification programs by itself or in collaboration with industry/such other Institutions deemed to have specialized expertise in the proposed area of training.
b) Only students of the Institution shall be eligible to register on payment of prescribed fee.
c) However, subject to availability of resources and the demand the Institution may offer the program to external candidates meeting the pre-qualification requirements and in the order of the merit.
d) The duration of the course and design of the content shall be done by the respective departments of the Institution by themselves or in collaboration with industry/such other institutions deemed to have specialized expertise in the proposed area of training.
e) If the duration of the course is less than or equal to 40 hours, it can be completed in one semester, otherwise, it can suitably distributed over a number of semesters.
f) Mere enrolment/registration for the program shall not entitle any claim for award of certificate.
g) A candidate shall be deemed eligible for the award of the certificate if he/she
   - Attends at least 75% of scheduled training sessions
   - Complies to all the requirements of submission of the assignments, presentations, seminars, projects, etc., and also appears for periodic tests.
   - Shall attain minimum levels of performance in tests as prescribed.
   - Shall remit such fee as deemed fit for the certification
   - A candidate registered and failed to meet the requirements shall be permitted to repeat the said training one another time after remitting 25% of the fee fixed for the program as re-registration fee.

If the student is absent for the periodic tests, the test shall be re-conducted on payment of 10% of fee.

5. COURSES OFFERED:

Name of the Program	Degree
UG Programs (Engineering & Technology)	B.Tech. (Civil) B.Tech. (EEE) B.Tech. (Mech.) B.Tech. (ECE) B.Tech. (CSE) B.Tech. (CHEM) B.Tech. (IT)
PG Programs (Engineering & Technology)	M.Tech. (Structural Engineering) M.Tech. (Power Systems) M.Tech. (PDM) M.Tech. (VLSI) M.Tech. (CN&IS)
Other PG Programs	MBA
Research Programs	Ph.D. in Civil, EEE, MECH, ECE, CSE, CHEM, MBA and MATHS

6. DISTRIBUTION AND WEIGHTAGE OF MARKS:

B.Tech.:

a). All Theory courses will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment:

Subjective tests	- 20 Marks
Objective tests	- 10 Marks
Assignments	- 10 Marks

- Two subjective tests shall be conducted.
- Each subjective test shall be conducted for 90 Minutes and have 3 questions each for 7 marks (No choice) and the same shall be scaled down to 20 Marks.
- Average of two subjective tests shall be considered.
- Two objective tests (online) shall be conducted each for 20 marks.
- Each objective test shall be conducted for 20 minutes and have 20 Multiple Choice Questions each for 1 mark and the same shall be scaled down to 10 Marks.
- Average of two objective tests shall be considered.
- Assignments shall be assessed for 10 marks.

External Assessment:

- External examination is for 60 marks (180 min). Question paper contains 10 questions (2 questions from each unit) and each question carries 12 marks. Student shall answer 5 questions (1 question from each unit).

b). **Laboratory/Practice:**

All Laboratory/Practice courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

- Continuous assessment for 15 marks for each experimental session finally averaged to 15 marks.
- Project based learning shall be assessed for 15 Marks.
- In Project based learning, a student has to identify a problem such that at least 3 or 4 modular learning of experiments shall be integrated and submit comprehensive report with solution at the end of the semester.
- An internal assessment test conducted at the end of the semester shall be assessed for 10 marks.

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Both internal and external examination shall include assessment of the student on
    a) Knowledge of principles/concepts involved
    b) Experimental design
    c) Result interpretation and analysis
    d) Experimental report

c). **Drawing/Design/Estimation:**

i) Computer Aided Engineering Graphics:

Evaluation Procedure:

The course will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Question paper contains 3 questions (with internal choice). **E**ach question carries 20 marks (5 marks for free hand drawing and list of commands & 15 marks for final drawing prepared in AUTOCAD). A Student shall answer all questions.

ii) Modeling and Assembly of Mechanical Elements:

Evaluation Procedure:

The course will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Semester End Examination shall include assessment of the student on Final drawings like modeling, assembly and drafting.
- Student is expected to execute one exercise.
- Final drawings like modeling, assembly and drafting hard copies shall be evaluated by both internal and external examiners

Integrated Course (Theory + Lab):

Theory and Lab shall be assessed for 200 Marks (Each 100 marks)

- For Integrated course, the theory shall be assessed for 100 marks, of which 40 marks for internal assessment and 60 marks for semester end external examination.
- The Lab shall be assessed for 100 marks , of which, 40 marks for internal assessment and 60 marks for semester end external examination

Socially Relevant Project:

- A student shall identify and provide a solution to the problem relevant to society/Profession/Industry.
- A student shall engage at least 15 hours on socially relevant project. Socially relevant project shall be evaluated internally for 50 marks by Project Review Committee (PRC). PRC comprising of HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide shall review the progress.

Mini Project:

- A student shall undergo internship for a period of 4 weeks/provide solution to the problem relevant to Industry/ Modern tool during the vacation after VI semester and submit comprehensive report.
  - Mini project shall be evaluated internally for 50 marks by Project Review Committee (PRC).
  - PRC shall prepare rubrics for assessment.

Project Evaluation:

Project is divided into 2 phases – Phase I & Phase II

- Evaluation shall comprise of internal and external assessment.
  Internal: 110 (Phase I 50 marks, Phase II 60 Marks)
  External: 90
- A project Review committee (PRC) comprising of HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide shall review the progress once in four weeks.

Project Phase I:

- Project Phase I shall be evaluated internally by PRC for 50 Marks.
- A student shall undertake project phase I during the VII semester.
- A student shall report to the guide/external supervisor and work under his supervision at least 2 hours per week.
- Assessment shall be on
  - Literature review
  - Identification and statement of the Problem

Project Phase II:

- A student shall undertake project phase II during the VIII semester.
- A student shall report to the guide/external supervisor and work under his supervision at least 8 hours per week.
- Internal evaluation shall be done by HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide for 60 marks.
- External evaluation shall be done by HoD, Guide/Internal Examiner and External Examiner for 90 marks.
- Assessment shall be on
  a) Review on fundamental knowledge involved
  b) Inter disciplinary aspect
  c) Experimental/methodology design
  d) Result analysis and interpretations
  e) Report writing
  f) Team work
  g) Presentation
  h) Viva-voce

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2^{nd}, 3^{rd} and 4^{th} years of study shall be same as applicable to regular B.Tech students.

7. ATTENDANCE REGULATIONS:

B.Tech.:

I. A student shall be eligible to appear for end semester examinations, if he or she acquires a minimum of 75% of attendance in aggregate of all the subjects (Theory & Lab.) for the semester.
II. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the college academic committee.
III. Shortage of attendance below 65% in aggregate of all the subjects (Theory & Lab) for the semester shall not be Condoned.
IV. Detained student shall seek re- admission for that semester when offered within 4 weeks from the date of commencement of class work.

PROMOTION RULE (Based on attendance):

- A Student shall be promoted to the next semester on fulfillment of minimum attendance requirement (75%) of current semester.

PROMOTION RULE (Based on credits):

- A student shall be promoted from IV semester to V semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to IV semester from the following examinations irrespective of whether the candidate takes the examination or not.
    - Two regular and Two supplementary examinations of I semester
    - Two regular and One supplementary examinations of II semester
    - One regular examination and One supplementary examination of III semester
    - One regular examination of IV semester.

- A student shall be promoted from VI semester to VII semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to IV semester from the following examinations irrespective of whether the candidate takes the examination or not.
    - Three regular and Three supplementary examinations of I semester
    - Three regular and Two supplementary examinations of II semester
    - Two regular and Two supplementary examinations of III semester
    - Two regular and One supplementary examinations of IV semester
    - One regular and One supplementary examination of V semester
    - One regular examination of VI semester.

B.TECH (Lateral Entry):

PROMOTION RULE (Based on attendance):

A Student shall be promoted to the next semester on fulfillment of minimum attendance requirement of current semester.

PROMOTION RULE (Based on credits):

A student shall be promoted from VI semester to VII semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to VI semester from the following examinations irrespective of whether the candidate takes the examination or not.

- Two regular and Two supplementary examinations of III semester
- Two regular and one supplementary examinations of IV semester
- One regular and One supplementary examinations of V semester
- One regular examination of VI semester.

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2nd, 3rd and 4th years of study shall be same as applicable to regular B.Tech students.

8. MINIMUM ACADEMIC REQUIREMENTS:

B.Tech.: (Theory/Lab)

i. A student is deemed to have satisfied the minimum academic requirements for a course on securing at least 24 marks out of 60 marks at semester end examination and overall minimum of 40 marks out of 100 marks including internal assessment.

ii. **Integrated Course (Theory + Lab):**

- The student shall secure minimum 24 marks out of 60 marks at semester end examination and overall 40 marks out of 100 marks for Theory and Laboratory courses independently. In case of failure in either theory or Laboratory course, the student should re-appear for both theory and laboratory.
- The assessment shall be done independently for both theory and laboratory courses and final marks shall be calculated on weighted average method for converting marks into grade points.

  Sample calculation:

  Integrated course-5 credits. Theory is for 3 credits and laboratory is for 2 credits.

  Total Marks obtained in theory: 70 out of 100 (3 Credits)

  Total Marks obtained in Lab : 90 out of 100 (2 Credits)

  Final marks of the integrated course is

  (70X3 + 90X2) / 5 = 78 Marks

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2nd, 3rd and 4th years of study shall be same as applicable to regular B.Tech students.

9. GRADING SYSTEM:

B.Tech. / B.Tech. (Lateral Entry)

Semester Grade Point Average (SGPA) for the current semester which is calculated on the basis of grade points obtained in all courses, except audit courses and courses in which satisfactory or course continuation has been awarded,

SGPA= Σ (course credits earned x Grade points) /
Σ (Total course credits in the semester.

CGPA= Σ (course credits earned x Grade points) up to successfully completed semesters / Σ (Total course credits up to successfully completed.

The UGC recommends a 10-point grading system with the following letter grades as

given below:

O	(Outstanding)	10
A+	(Excellent)	9
A	(Very Good)	8
B+	(Good)	7
B	(Above Average)	6
C	(Average)	5
P	(Pass)	4
F	(Fail)	0
Ab	(Absent)	0

- iii. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X10 = 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			**139**

Thus, **SGPA** =139/20 = 6.95

Illustration for CGPA

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
Credits: 16	Credits: 18	Credits: 25	Credits: 21	Credits: 23	Credits: 22
SGPA: 7.9	SGPA: 7.8	SGPA: 7.6	SGPA: 8.0	SGPA: 8.3	SGPA: 8.6

Semester 7	Semester 8
Credits: 21	Credits:14
SGPA: 8.2	SGPA: 8.5

Thus,

CGPA= $\frac{16x7.9 + 18x7.8 + 25x7.6 + 21x8.0 + 23x8.3 + 22x8.6 + 21x8.2 + 14x8.5}{160}$ = **8.1**

10. ELIGIBILITY FOR AWARD OF DEGREE:

B.Tech:

A student shall be eligible for award of the degree if he/she fulfills the following conditions:

1) Successfully completes all the courses prescribed for the Program.
2) CGPA greater than or equal to 4.5(Minimum requirement for Pass),

11. AWARD OF CLASS:

B.Tech:

Eligible Candidates for the award of B.Tech., Degree shall be placed in one of the following Classes based on CGPA.

Class	CGPA
Distinction	≥ 7.5
First Class	≥ 6.5
Second Class	≥ 5.5
Pass class	≥ 4.5

12. INSTRUCTION DAYS:

A semester shall have a minimum of 90 clear instruction days (including internal examinations).

13. Transfers from other Institutions shall not be permitted.

14. SUPPLEMENTARY EXAMINATIONS:

Supplementary examinations shall be conducted within 4 weeks from the date of announcement of results of regular examinations.

15. WITHHOLDING OF RESULTS: The result of a student shall be withheld

- If the student has not paid the dues, if any, to the institution
- If any case of pending disciplinary action ,
- Involvement in any sort of malpractices etc.
- Involvement in ragging.

16. TRANSITORY REGULATIONS:

A Candidate shall be readmitted from University regulations to A1 regulations or from A1 regulations to A2 regulations as per the guide lines of JNTUK.

17. AMENDMENTS TO REGULATIONS:

The Academic Council of MVGR College of Engineering (Autonomous) reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations, and/ or Syllabi or any other such matter relating to the requirements of the program which are compatible to the contemporary/emerging trends effectively meeting the needs of society/industry/stake holding groups.

18. Regulations for MALPRACTICES during the conduct of examinations

	Nature of Malpractices/Improper conduct	Punishment
1 (a)	If the candidate possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only. *
(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. *

2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled. *
3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider/candidate not on rolls, he will be handed over to the police and a case is registered against him. *
4	If the candidate mishandles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. Also if the answer script is mutilated / damaged disturbing the shape, of the script, answers, the bar code intentionally.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. He shall be debarred from class work and all examinations and be allowed to reregistered for the next subsequent odd or even semester only. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.*

5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	The same should be brought to the notice of CE who in turn in consultation with malpractice committee makes decision for cancellation of the performance in that subject. *
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. *
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. *
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. *

9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. *
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. *
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.*

*

19. General :

- Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
- The academic regulation should be read as a whole for the purpose of any interpretation.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

* * *

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

- ⇨ **Ragging within or outside any educational institution is prohibited.**
- ⇨ **Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student**

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	 2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	 10 Months	+	Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE MVGR A RAGGING FREE CAMPUS

Ragging

ABSOLUTELY NO TO RAGGING

1. **Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.**
2. **Ragging entails heavy fines and/or imprisonment.**
3. **Ragging invokes suspension and dismissal from the College.**
4. **Outsiders are prohibited from entering the College and Hostel without permission.**
5. **Girl students must be in their hostel rooms by 7.00 p.m.**
6. **All the students must carry their Identity Cards and show them when demanded**
7. **The Principal and the Wardens may visit the Hostels and inspect the rooms any time.**

PROGRAM STRUCTURE

B.Tech. (CHEMICAL ENGINEERING)

I SEMESTER:

S.No	Course code	Theory/Lab	L	T	P	C
1	A2MAT101	Mathematics-I	3	-	-	3
2	A2PYI101	Engineering Physics (Theory + Lab)	3	-	3	5
3	A2CII201	Programming for Problem Solving (Theory + Lab)	3	-	3	5
4	A2MED201	Computer Aided Engineering Graphics	1	-	3	3
5	A2EHA701	Constitution of India	2	-	-	0
		Total				**16**

II SEMESTER:

S.No	Course code	Theory/Lab	L	T	P	C
1	A2MAT102	Mathematics-II	3	-	-	3
2	A2CYI101	Engineering Chemistry (Theory + Lab)	3	-	3	5
3	A2EEI201	Basic Electrical Engineering (Theory + Lab)	3	-	3	5
4	A2CHW201	Work Shop	-	-	3	2
5	A2EHL001	English-I	1	-	3	3
		Total				**18**

III SEMESTER:

S.No	Subject Code	Subject	L	T	P	C
1	A2MAT105	Mathematics-III	3	-	-	3
2	A2XXT1XX	Biology for Engineers	3	-	-	3
3	A2CHT202	Design thinking and Product Innovation	3	-	-	3
4	A2CHI201	AI Tools, Techniques & Applications	3	-	3	5
5	A2CHT301	Chemical Technology	3	-	-	3
6	A2CHT302	Fluid Mechanics for Chemical Engineers	3	-	-	3
7	A2CHL301	Fluid Mechanics Lab	-	-	3	1.5
8	A2CHL302	AutoCAD Lab	-	-	3	1.5
9	A2EHA702	Indian Traditional Knowledge	2	-	-	0
		Total				**23**

IV SEMESTER:

S.No	Subject Code	Subject	L	T	P	C
1	A2MAT110	Mathematics-IV	3	-	-	3
2	A2EHL002	English-II (Technical English)	2	-	2	3
3	A2CHT201	Internet of Things (IOT)	3	-	-	3
4	A2CHT303	Chemical Process Calculations	3	-	-	3
5	A2CHT304	Mechanical Unit Operations	3	-	-	3
6	A2CHT305	Process Heat Transfer	3	-	-	3
7	A2CHL303	Mechanical Unit Operations Lab	-	-	3	1.5
8	A2CHL304	Process Heat Transfer Lab	-	-	3	1.5
9	A2CHP602	Mini Project	-	-	4	2
10	A2CHA701	Environmental Science	2	-	-	0
		Total				**23**

V SEMESTER:

S.No	Subject Code	Subject	L	T	P	C
1	A2CHT306	Chemical Engineering Thermodynamics	3	-	-	3
2	A2CHT307	Chemical Reaction Engineering - I	3	-	-	3
3	A2CHT308	Mass Transfer - I	3	-	-	3
4	A2CHT4XX	Professional Elective-1	3	-	-	3
5	A2CHT5XX	Open Elective - I	3	-	-	3
6	A2CHT5XX	Open Elective - II	3	-	-	3
7	A2CHL305	Chemical Reaction Engineering Lab	-	-	3	1.5
8	A2CHL306	Mass Transfer Lab	-	-	3	1.5
		Total				**21**

VI SEMESTER:

S.No	Subject Code	Subject	L	T	P	C
1	A2CHT309	Chemical Reaction Engineering - II	3	-	-	3
2	A2CHT310	Mass Transfer - II	3	-	-	3
3	A2CHT311	Process Instrumentation & Control	3	-	-	3
4	A2CHT312	Process Modeling & Simulation	3	-	-	3
5	A2CHT4XX	Professional Elective-II	3	-	-	3
6	A2CHT5XX	Open Elective - III	3	-	-	3
7	A2MST001	Managerial Economics & Financial Analysis	3	-	-	3
8	A2CHL307	Process Instrumentation & Control Lab	-	-	3	1.5
9	A2CHL308	Process Modeling & Simulation Lab	-	-	3	1.5
		Total				**24**

VII SEMESTER:

S.No	Subject Code	Subject	L	T	P	C
1	A2CHT313	Chemical Process Equipment Design & Economics	3	-	-	3
2	A2CHT314	Transport Phenomena	3	-	-	3
3	A2CHT5XX	Open Elective - IV	3	-	-	3
4	A2CHT4XX	Professional Elective-III	3	-	-	3
5	A2CHT4XX	Professional Elective-IV	3	-	-	3
6	A2EHT001	Professional Ethics and Human Values	3	-	-	3
7	A2CHP601	Socially Relevant Project	-	-	2	1
8	A2CHP603	Project Phase - I	-	-	4	2
		Total				**21**

VIII SEMESTER:

S.No	Subject Code	Subject	L	T	P	C
1	A2CHT4XX	Professional Elective-V	3	-	-	3
2	A2CHT4XX	Professional Elective-VI	3	-	-	3
3	A2CHP604	Project Phase - II	-	-	16	8
		Total				**14**

Professional Elective-I		
S.No	**Subject Code**	**Subject Name**
1	A2CHT401	New Material Technology
2	A2CHT402	Fertilizer Technology
3	A2CHT403	Polymer Technology
Professional Elective-II		
S.No	**Subject Code**	**Subject Name**
1	A2CHT404	Petroleum Refining
2	A2CHT405	Petro Chemical Technology
3	A2CHT406	Fuel Cell Technology
Professional Elective-III		
S.No	**Subject Code**	**Subject Name**
1	A2CHT407	Phase & Reaction Equilibria
2	A2CHT408	Corrosion & Control
3	A2CHT409	Process Intensification

Professional Elective-IV		
S.No	**Subject Code**	**Subject Name**
1	A2CHT410	Food Processing Technology
2	A2CHT411	Nano Technology
3	A2CHT412	Pharmaceutical Technology
Professional Elective-V		
S.No	**Subject Code**	**Subject Name**
1	A2CHT413	Bio Chemical Engineering
2	A2CHT414	Enzyme Engineering
3	A2CHT415	Nuclear Reactor Engineering
Professional Elective-VI		
S.No	**Subject Code**	**Subject Name**
1	A2CHT416	Industrial Bio Technology
2	A2CHT417	Industrial Safety & Hazard Management
3	A2CHT418	Optimization of Chemical Processes

Open Elective-I offered by Chemical Engineering Department to other Departments		
S.No	**Subject Code**	**Subject Name**
1	A2CHT501	Industrial Pollution Control & Engineering
2	A2CHT502	Renewable Energy Resources
3	A2CHT503	Solid Waste Management
Open Elective-II offered by Chemical Engineering Department to other Departments		
S.No	**Subject Code**	**Subject Name**
1	A2CHT504	Energy Engineering
2	A2CHT505	Green Chemistry & Technology
3	A2CHT506	Air Pollution Control and Design of Equipment
Open Elective-III offered by Chemical Engineering Department to other Departments		
S.No	**Subject Code**	**Subject Name**
1	A2CHT507	Industrial Waste Water Engineering
2	A2CHT508	Environmental Impact Assessment
3	A2CHT509	Computational Fluid Dynamics
Open Elective-IV offered by Chemical Engineering Department to other Departments		
S.No	**Subject Code**	**Subject Name**
1	A2CHT510	Bio Energy
2	A2CHT511	Energy Conservation and Management
3	A2CHT512	Design & Analysis of Experiments

A2MAT101	SEMESTER - I	L	T	P	C
	MATHEMATICS-I (common to ALL branches)	3	0	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: LINEAR ALGEBRA-1

Rank of a matrix: Elementary row and column transformations, equivalent matrices, Echelon form of a matrix, calculation of rank by reducing the matrix to Echelon form. System of equations: Linear system of equations, homogeneous and non-homogeneous system of equations, consistency criteria, trivial and non-trivial solutions, solving system of equations by Rank method; Eigenvalues and Eigenvectors: Finding Eigenvalues and Eigenvectors, properties of Eigenvalues and Eigenvectors (statements) including spectral mapping theorem.

UNIT- II: LINEAR ALGEBRA-2

Cayley-Hamilton Theorem: Statement of the theorem and its verification. Applications: Finding higher powers of a matrix, finding matrix polynomials, finding inverse of matrix. Diagonal form of a matrix: Reduction to diagonal form, spectral and modal matrices, finding higher powers of a matrix using diagonalisation, Quadratic forms: Matrix form of quadratic forms, orthogonal transformation, canonical form, reduction of quadratic form to canonical form by orthogonal transformation method, rank, index, signature and nature (definiteness) of a quadratic form.

UNIT-III: FIRST ORDER DIFFERENTIAL EQUATIONS & APPLICATIONS

Outlines: Differential Equations(DEs), Order and degree of a DE, Formation of DEs, general solutions of a DE; Solving first order and first degree DEs: linear DEs, Bernoulli's DEs (reducible to linear), exact DEs, integrating factors, non-exact DEs (reducible to exact).

Applications to real world problems: Newton's law of cooling, laws of growth and decay, family of curves, orthogonality of families curves, orthogonal trajectories (Cartesian and polar curves).

UNIT-IV: HIGHER ORDER DIFFERENTIAL EQUATIONS

Differential equations of higher order: Linear differential equations of higher order, its operator form. Solution concepts: General (complete) solution, particular solution. Solution of linear differential equations of higher order: Auxiliary equations, rules for finding complementary functions, rules for finding particular integrals (general and special methods).

UNIT-V: LAPLACE TRANSFORMS

Laplace transformation: Laplace transformation of elementary functions, Properties: Linearity, change of scale, first shifting properties, finding Laplace transformations using properties, Advanced properties: Laplace transformations of derivatives and integrals, multiplication by t^n, division by t (statements), finding Laplace transformations

using advanced properties; Inverse Laplace transformations: Finding inverse Laplace transformations using partial fractions, statement of Convolution theorem, finding inverse Laplace transformations by Convolution theorem; Applications: Solving Initial Value Problems by using Laplace transformations.

//Topics prefixed with 'outlines / overview' are not for assessment//

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017
2. T.K.V. Iyengar et al, Engineering Mathematics, S. Chand Publishers, Revised edition

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010
3. T. Veerarajan, Higher Engineering Mathematics, Tata McGraw-Hill, 2008

COURSE OUTCOMES: Learners at the end of this course will be able to

CO 1	KO#1	Recall the concepts of Linear algebra
CO 2	KO#2	Recall the solution methods and applicability of first order differential equations
CO 3	KO#3	Recall the solution methods of higher order differential equations and the concepts of Laplace transforms
CO 4	UO#1	Use and interpret the concepts of linear algebra
CO 5	UO#2	Use and interpret solution methods and applicability of first order differential equations
CO 6	UO#3	Use and interpret solution methods of higher order differential equations and the concepts of Laplace transforms
CO 7	AO#1	Apply the concepts of linear algebra, differential equations and Laplace transformation to model and solve real world problems

CO/PO Mapping

Course Title:	Mathematics-I (Common to ALL Branches)													
Course Code:	A2MAT101													
Course Designed by	Dept. of Mathematics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2							2			
CO2	3	3		2							2			
CO3	3	3		2							2			
CO4	3	3		2							2			
CO5	3	3		2							2			
CO6	3	3		2							2			
CO7	3	3		2							2			

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 06.07.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PYI101	SEMESTER – I	L	T	P	C
	ENGINEERING PHYSICS (Common to CIV,ME & CHEM)	3	-	-	3
	Total Contact Hours – 48				

SYLLABUS

Unit – I: CRYSTALLOGRAPHY [8 hrs]

Introduction- Crystal systems- Bravais lattices- Packing fractions of simple, body centered, face centered cubic structures - Directions and Planes in crystals- Miller indices- Inter planar spacing- Bragg's Law of X-Ray diffraction- Powder X-Ray diffraction method.

Unit –II: LASER & FIBER OPTICS [10hrs]

LASER: Introduction- Absorption, Spontaneous and stimulated emission of radiation- Einstein coefficients- Population inversion- Basic components of laser- Nd YAG Laser – CO_2 Laser- Applications of LASER.

FIBER OPTICS: Introduction- Principle of optical fiber- Numerical Aperture- Acceptance angle- Classification of optic fibers- Applications of fibers.

Unit-III: ULTRASONICS & ACOUSTICS [10hrs]

Ultrasonics-Introduction- Properties of ultrasonic sounds- Generation of Ultrasonic sounds- Magnetostriction- Piezoelectric effect- Detection- Kunts tube- Converse piezoelectric method- Ultrasonic Nondestructive testing technique (pulse-echo technique under reflection mode)- Applications.

ACOUSTICS- Introduction– Reverberation- Reverberation time- Sabines formula for reverberation time- Absorption coefficient and its measurement- Factors effecting acoustic design of hall.

Unit – IV: THERMODYNAMICS [10hrs]

Introduction- First Law- Isothermal process- Adiabatic process- Work done- Second Law- Carnot's heat engine- Efficiency- Entropy- Physical significance- Entropy and second law- Temperature entropy diagram- Third Law of Thermodynamics- Applications of thermodynamics.

Unit – V: PRINCIPLES OF MECHANICS [10hrs]

Introduction- System of forces- Resultant of coplanar forces- Method of resolution- Parallel forces- Moment of force- Varignon theorem- Force system in space- Friction- Limiting friction & Impending motion- Coulomb's laws of dry friction- Coefficient of friction- Cone of friction- Types of friction (qualitative).

TEXTBOOKS

1. Engineering Physics by R.K. Gaur and S.L. Gupta, Dhanpat Rai Publications.

REFERENCES

1. RESNICK, HALLIDAY and WALKER, Principles of Physics, Wiley Publishers
2. A.NELSON, Engineering Mechanics: Statics & Dynamics by, Tata Mc Graw Hill Publishers.
3. P.K. NAG, Engineering Thermodynamics, Mc. Graw Hill Publishers

COURSE OUTCOMES:

CO1. The student will be able to recognize the underlying principles of crystalline solids, LASER production and Optical fibers

CO2. The student will be able to gain knowledge on the fundamentals of acoustics and production & detection of ultrasonics

CO3. The student will be able to describe the essentials of thermodynamics, force systems and friction.

CO4. The student will be able to understand crystal structures and X-ray diffraction as a tool for crystal structure analysis.

CO5. The student will be able to understand the importance of industrially relevant LASERS, applications of optical fibers and the prominence of ultrasonics in nondestructive testing.

CO6. The student will be able to understand basic processes involved in thermo-dynamical systems and force systems

CO7. The student will have the ability to apply the conceptual knowledge of forces and its related physical quantities in solving engineering problems.

CO/PO MAPPING:

Course Title:	Engineering Physics													
Course Code:	A2PYI101													
Course Designed by	Dept. of Physics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3						1				1		
CO2	3	3						1				1		
CO3	3	3						1				1		
CO4	3	3						1				1		
CO5	3	3						1				1		
CO6	3	3						1				1		
CO7	3	3						1				1		

Course designed by	DEPARTMENT OF PHYSICS
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PYI101	SEMESTER – I	L	T	P	C
	ENGINEERING PHYSICS LAB	-	-	3	2
	Total Contact Hours – 42				

LIST OF EXPERIMENTS

1.	Determination of size of the micro dimensional system by Laser diffraction.
2.	Determination of numerical aperture and acceptance angle of the optic fiber.
3.	Determination of lattice constants of the crystal systems.
4.	Verification of laws of transverse vibrations in stretched strings by using Sonometer.
5.	Determination of velocity of ultrasonic sounds in liquids by acoustic grating method
6.	Determination of thermal conductivity coefficient of the disc shaped material.
7.	Determination of specific heat of the given liquid by Newton's law of cooling principle.
8.	Determination of temperature coefficient resistance for the thermistor.
9.	Determination of the static friction coefficient.
10.	Determination of rigidity modulus of the wire shaped material by using Torsional pendulum.

TEXTBOOKS:

1. BALASUBRAMANIAN.S, SRINIVASAN.M..N, A Text book of Practical Physics, S Chand Publishers, 2017

REFERENCES:

1. https://vlab.amrita.edu.

COURSE OUTCOMES:

CO1. Design experiments to determine the size of the micro-dimensional system and the parameters impelling communication through optic fibre.

CO2. Investigate the powder X-Ray diffraction patterns for crystal structure analysis.

CO3. Design experiments for demonstration of mechanical resonance and determine the velocity of ultrasonic sounds in liquid media.

CO4. Design experiments to determine physiognomies of materials like the thermal conductivity coefficient (K), specific heat (s) and temperature coefficient of resistance (α).

CO5 Design experiments to determine the mechanical properties like the rigidity modulus (η) and the static friction coefficient (μ_s).

CO/PO MAPPING:

Course Title:	Engineering Physics Lab													
Course Code:	A2PYI101													
Course Designed by	Dept. of Physics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3						1	2	1		1		
CO2	3	3						1	2	1		1		
CO3	3	3						1	2	1		1		
CO4	3	3						1	2	1		1		
CO5	3	3						1	2	1		1		

Course designed by	DEPARTMENT OF PHYSICS
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CIT201	SEMESTER – I	L	T	P	C
	PROGRAMMING FOR PROBLEM SOLVING	3	0	0	3
	Total Contact Hours : 54				
	Prerequisites: Mathematics				

COURSE OBJECTIVES

COBJ1.	Students will study systematic approach to problem solution specification using finite number of unambiguous steps.
COBJ2.	Students will gain understanding of procedural language features using C as the template.
COBJ3.	Students will read and analyse alternative construct choices in procedural language C.
COBJ4.	Students will get exposure to systematic approach of automated solution design, implementation and testing using a procedural language.

SYLLABUS

UNIT – I: [9 HOURS]

INTRODUCTION: Introduction to Programming, Computer System, Hardware and Software concepts.

PROBLEM SOLVING: Algorithm, Pseudo-code, flow-chart, program development steps, high-level, Assembly and machine languages.

BASICS OF C PROGRAMMING: Structure of C program, identifier, basic data types and sizes, constants, variables, arithmetic operators, relational operators, logical operators, increment and decrement operators, assignment operator, conditional operator, scanf and printf built-in functions, Creating and running programs.

UNIT – II: [9 HOURS]

BIT-WISE OPERATORS: logical, shift, rotation, masks.

EXPRESSIONS: expressions, type conversions, conditional expressions, precedence and order of evaluation.

SELECTION: Two-way selection: if-else, nested if, examples, multi-way selection: switch, else-if, examples.

ITERATIVE: loops - while, do-while and for statements, break continue, event and counter controlled loops.

UNIT – III: [18 HOURS]

Part – I: [9 HOURS]

ARRAYS: Arrays (1-D, 2-D), Character arrays and Strings, Searching (Linear Search and Binary Search).

Part – II: [9 HOURS]

BASIC ALGORITHMS: Basic Sorting Algorithms (Bubble, Insertion and Selection), comparing algorithms for complexity.

FUNCTIONS: Functions, Scope and Extent of Variables, Function Parameters, parameter passing using call-by-value, sub-routines, Storage Classes,#define,#ifdef, #ifndef pre-processor directives.

UNIT – IV: [9 HOURS]

RECURSION: Definition of Recursion, example programs using recursion like finding Factorial, Fibonacci series, Quick sort, puzzle solving using recursive functions (towers of hanoi, ackerman function).

POINTERS: Definition of Pointers, Pointer Type, Pointer Arithmetic, Function parameter passing using call-by-reference.

MEMORY ALLOCATION: Difference between static and dynamic memory allocation, dynamic memory allocation using built-in functions, dangling pointer, unreferenced memory problem.

UNIT – V: [9 HOURS]

ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, bit-fields, concept of linked list, program applications.

FILE-HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, command line arguments.

Suggested Text Books

1. Programming For Problem Solving, Behrouz A.Forouzan & Richard F.Gilberg, Cengage Publishers, 3rd Edition
2. Programming In C:A Practical Approach, Ajay Mittal, Pearson Education

Suggested Reference Books

1. Brian W. Kernighan And Dennis M. Ritchie, The C Programming Language, Prentice Hall Of India
2. Introduction To C Programming, Reema Thareja, Oxford University Press
3. E. Balaguruswamy, Programming In Ansi C, Tata Mcgraw-Hill

COURSE OUTCOMES

The student will

1. Have the ability to **describe** a formal algorithmic solution for the given problem, **list** the features of C including scalar & vector data types, operators, **Outline** expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.

2. Have the ability to **describe** one and two-dimensional arrays, **outline** loops and arrays for searching and **describe** various sorting techniques.

3. Have the ability to **outline** the purpose of functions, pointers, command line arguments, dynamic memory allocation. **Define** storage classes. **Describe** command like arguments, structures, unions, and enumeration. Have knowledge of handling files.

4. Have the ability to **solve** complex expressions, **design** algorithms and **develop** programs in C language using the basic constructs, data types, operators, control & iterative statements, and arrays.

5. Have the ability to **apply** arrays to solve complex matrix related problems and strings. **Compare and contrast** various searching and sorting techniques for complexity.
6. Have the ability to **distinguish between** function call types. **Draw inferences on** command line arguments, storage classes, and pre-processor directives. **Use** pointers with functions, arrays, strings, to **solve** complex problems. **Give example** and **solve** classical recursion problems**. Compare and contrast** static and dynamic memory allocation, and **apply** them. **Use** structures and unions to implement and **solve** real-time problems. **Apply** file related functions to process files.

7. Have the ability to **Fully appreciate** the art of procedural programming in C and develop programs **optimally** using the full feature set of C language.

Course Title:	Programming for problem solving (Common to ALL Branches)														
Course Code:	A2CIT201														
Course Designed by	Dept. of Computer Science and Engineering														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSOM	PSON	PSOO
CO1	3	3						3	2	1		2	1	1	1
CO2	3	3						3	2	1		2	1	1	1
CO3	3	3						3	2	1		2	1	1	1
CO4	3	3	3	3	3	3	3	3	2	1	1	2	3	3	3
CO5	3	3	3	3	3	3	3	3	2	1	1	2	3	3	3
CO6	3	3	3	3	3	3	3	3	3	1	1	2	3	3	3
CO7	3	3	3	3	3	3	3	3	3	1	1	3	3	3	3

Levels of Correlation: High-3, Medium-2, Low-1

PROGRAMMING FOR PROBLEM SOLVING PRACTICE

COURSE OBJECTIVES	
1.	To use basic data types, operators, expressions and expression evaluation mechanisms using C Programming Language.
2.	To implement control flows construct in C Programming Language and understand the syntax, semantics and usability contexts of these different construct.
3.	To develop composite data types in C and constructs available to develop their data-types, utilize them to model things and dealing with data from and to external files.
4.	To design programs with different variations of the constructs available for practicing modular programming and understand the pros and cons of using different variants and apply optimization.

UNIT – I

WEEK 1:

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using computers
Lab1: Familiarization with programming environment

i) Exposure to Turbo C, gcc, Code Blocks IDE
ii) Writing simple programs using printf(), scanf()

WEEK 2:

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments/Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts
Lab1: Converting algorithms/flowcharts into C Source code

Developing the algorithms/flowcharts for the following sample programs

i. Sum and average of 3 numbers
ii. Conversion of Fahrenheit to Celsius and vice versa
iii. Simple interest calculation

WEEK 3:

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:
Lab 3: Simple computational problems using arithmetic expressions

i) Finding the square root of a given number
ii) Finding compound interest
iii) Area of a triangle using heron's formulae
iv) Distance travelled by an object

UNIT – II

WEEK 4:

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and their precedence and associativity:
Lab 4: Simple computational problems using the operator's precedence and associativity

i) Evaluate the following expressions
   a. A+B*C+(D*E)+F*G
   b. A/B*C-B+A*D/3
ii) a. A+++B---A
   b. J=(i++)+(++i)
iii) Find the maximum of three numbers using conditional operator
iv) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5:

Objective: Explore the full scope of different variants of "if construct" namely if-else, null-else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures

i) Write a C program to find the max and min of four numbers using if-else
ii) Write a C program to generate electricity bill
iii) Find the roots of the quadratic equation
iv) Write a C program to simulate a calculator using switch case
v) Write a C program to find the given year is a leap year or not

WEEK 6:

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops:
Lab 6: Iterative problems e.g., the sum of series

i) Find the factorial of given number using any loop
ii) Find the given number is a prime or not
iii) Compute sine and cos series
iv) Checking a number palindrome
v) Construct a pyramid of numbers

UNIT – III

WEEK 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1D Arrays: searching
Lab 7: 1D Array manipulation, linear search

i) Find the min and max of a 1-D integer array
ii) Perform linear search on1D array
iii) The reverse of a 1D integer array
iv) Find 2's complement of the given binary number
v) Eliminate duplicate elements in an array

WEEK 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2D arrays, Sorting and Strings
Lab 8: Matrix problems, String operations, Bubble sort

i) Addition of two matrices
ii) Multiplication two matrices
iii) Sort array elements using bubble sort
iv) Concatenate two strings without built-in functions
v) Reverse a string using built-in and without built-in string functions

UNIT-IV

WEEK 9:

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 9: Functions, call by value, scope and extent,
Lab 9: Simple functions using call by value, Solving differential equations using Eulers theorem

i) Write a C function to calculate NCR value
ii) Write a C function to find the length of a string
iii) Write a C function to transpose of a matrix
iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 10:

Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 10: Recursion, the structure of recursive calls

Lab 10: Recursive functions

i) Write a recursive function to generate Fibonacci series
ii) Write a recursive function to find the lcm of two numbers
iii) Write a recursive function to find the factorial of a number
iv) Write a C Program to implement Ackermann function using recursion
v) Write a recursive function to find the sum of series.

WEEK 11:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 11: Call by reference, dangling pointers
Lab 11: Simple functions using Call by reference, Dangling pointers

i) Write a C program to swap two numbers using call by reference
ii) Demonstrate Dangling pointer problem using a C program
iii) Write a C program to copy one string into another using pointer
iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

UNIT – V

WEEK 12:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc(), calloc(), realloc() and free() functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 12: Pointers, structures and dynamic memory allocation
Lab 12: Pointers and structures, memory dereference

i) Write a C program to find the sum of a 1D array using malloc()
ii) Write a C program to find the total, average of n students using structures
iii) Enter n students data using calloc() and display failed students list
iv) Read student name and marks from the command line and display the student details along with the total.
v) Write a C program to implement realloc()

WEEK 13:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly-linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 12: Bitfields**,** Self-Referential Structures, Linked lists
Lab 12: Bitfields, linked lists

i) Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit-fields
ii) Create and display a singly linked list using self-referential structure
iii) Demonstrate the differences between structures and unions using a C program
iv) Write a C program to shift/rotate using bitfields
v) Write a C program to copy one structure variable to another structure of the same type.

WEEK 14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling:
Lab 14: File operations

i) Write a C program to write and read text into a file
ii) Write a C program to write and read text into a binary file using fread() and fwrite()
iii) Copy the contents of one file to another file
iv) Write a C program to merge two files into the third file using command-line arguments
v) Find no. of lines, words and characters in a file
vi) Write a C program to print last n characters of a given file.

TEXTBOOKS:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

REFERENCES:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India
2. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

COURSE OUTCOMES

CO1.	**Demonstrate** the ability to write a formal algorithmic solution for the given problem, **name & explain** the features of C like types including scalar & vector types, operators, expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.
CO2.	**Implement** one and two-dimensional arrays to solve simple mathematical and matrix related problems. **Make use of** loops and arrays for searching and **Compare** various sorting techniques.
CO3.	**Identify** the purpose of functions, pointers, command line arguments, dynamic memory allocation. **Define** storage classes. **Understand** command like arguments, structures and unions. Have **knowledge** of handling files.
CO4.	**Design** algorithms and **develop** programs in C language using the basic constructs, data types, operators, control statements, and arrays.
CO5	**Apply** pointers, functions, derived data types, and dynamic memory allocation, **design** solutions to challenging problems.
CO6	**Illustrate** the art of procedural programming in C and **develop** programs optimally using the full feature set of C language.

Course Title:	Programming for problem solving lab														
Course Code:	A2CII201														
Course Designed by	Dept. of CSE & IT														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2	3	1	1	1	2	2			2	2	2
CO2	3	3	1	2	3	1	1	1	2	2			2	2	2
CO3	3	3	2	3	3	2	1	1	2	2			3	3	3
CO4	3	3	2	3	3	3	1	1	2	2			3	3	3
CO5	3	3	3	3	3	3	1	1	2	2			3	3	3
CO6	3	3	3	3	3	3	1	1	3	3	3		3	3	3

Levels of Correlation: High-3, Medium-2, Low-1

Course designed by	DEPARTMENTS OF CSE & IT
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019

A2MED201	SEMESTER - I	L	T	P	C
	COMPUTER AIDED ENGINEERING GRAPHICS	1	-	3	3
	Total Contact Hours – 60				

SYLLABUS

UNIT-I

Overview of Computer Graphics:

Computer technologies that impact on graphical communication, Demonstrating knowledge of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line, The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.

Set up of the drawing page and the printer, Scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing.

Applying dimensions to objects, applying annotations to drawings;

UNIT-II

Layers: Setting up and use of Layers, layers to create drawings, create, edit and use customized layers, concept of view ports.

Introduction to Orthographic Projections: Projections of Points; Projections of Straight Lines parallel to both planes; Projections of Straight Lines-Parallel to one and inclined to other plane.

UNIT-III

Projections of Straight Lines and Planes: Lines inclined to both planes, determination of true lengths, angle of inclinations and traces, Projections of Planes

UNIT-IV

Projections and sections of solids: Projections of simple solids- Sections of solids

UNIT -V

Development of surfaces, Isometric Projection and Conversion of Isometric Views to Orthographic Views: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa

TEXT BOOKS

1. DM Kulkarni, AP Rastogi, AK Sarkar "Engineering graphics with Auto CAD" PHI Publishers
2. Bhatt N.D., Panchal V.M. & Ingle P.R "Engineering Drawing" Charotar Publishing House.

REFERENCE BOOKS

1. Shah, M.B. & Rana B.C "Engineering Drawing and Computer Graphics", Pearson Education.
2. Agrawal B. & Agrawal C. M "Engineering Graphics", TMH Publication.
3. Narayana, K.L. & P Kannaiah "Engineering Drawing", SciTech Publishers.
4. CAD Software Theory and User Manuals.

COURSE OUTCOMES

At the end of the course the students will be able to:

CO1: Prepare two dimensional drawings using draw and modify commands in Auto CAD software and represent dimensions to the drawings

CO2: Clearly differentiate different types of projections and get solutions to projections of points in Auto CAD by applying the layers concept

CO3: Solve problems related to projections of straight lines and planes

CO4: Prepare simple solids in CAD software and obtain solutions to projections and sections of solids

CO5: Develop the surfaces of simple solids, prepare Isometric drawings and convert isometric drawings into orthographic views

CO/PO Mapping

Course Title:	Computer Aided Engineering Graphics													
Course Code:	A2MED201													
Course Designed by	Dept. of Mechanical Engineering													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2		3	1		1	2	3	2	2	3	2
CO2	3	2	2		3	1		1	2	3			2	1
CO3	3	2	2		3	1		1	2	3			2	1
CO4	3	2	3		3	1		1	2	3	2	2	3	1
CO5	3	2	3		3	1		1	2	3	2	2	3	1

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

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A2EHA701	SEMESTER - I	L	T	P	C
	CONSTITUTION OF INDIA	2	-	-	0
	Total Contact Hours – 30				

SYLLABUS

UNIT – I: HISTORY OF MAKING OF THE INDIAN CONSTITUTION

History - Drafting Committee, (Composition & Working)

UNIT – II: PHILOSOPHY OF THE INDIAN CONSTITUTION: Preamble - Salient Features

UNIT-III: CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES: Fundamental Rights -Right to Equality -Right to Freedom -Right against Exploitation -Right to Freedom of Religion -Cultural and Educational Rights -Right to Constitutional Remedies ; Directive Principles of State Policy ; Fundamental Duties.

UNIT-IV: ORGANS OF GOVERNANCE: Parliament -Composition - Qualifications and Disqualifications - Powers and Functions - Executive - President - Governor - Council of Ministers; Judiciary, Appointment and Transfer of Judges, Qualifications.

UNIT – V: LOCAL ADMINISTRATION: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayati raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat : Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

TEXT BOOK:
Reference Source compilation

REFERENCES:
1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.

COURSE OUTCOMES:

CO1. Students will be able to discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.

CO2. Students will be able discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.

CO3. Students will be able to discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP]under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.

CO4. Students will be able to discuss the passage of the Hindu Code Bill of 1956.

CO5. Students will be able to discuss the powers of Executive, Judiciary and Legislature.

CO/PO Mapping

Course Title:	Constitution of India (Common to ALL Branches)													
Course Code:	A2EHA701													
Course Designed by	Dept. of English & Humanities													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2								
CO2						2								
CO3						2								
CO4						2								
CO5						2								

Course designed by	DEPARTMENT OF ENGLISH & HUMANITIES
Approval	Approved by: Meeting of Board of Studies held on 23.06.15
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

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A2MAT102	SEMESTER - II	L	T	P	C
	MATHEMATICS-II (MEC,ECE,EEE,CHE & CIV)	3	0	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: NUMERICAL METHODS-1

Solving Algebraic and Transcendental Equations: Intermediate value theorem (statement), solution concepts, error in solution, measure of accuracy, approximate and exact solutions, Solution methods: Bisection method, Regula-Falsi method and Newton-Raphson Iterative method; Finite differences: Forward, backward and shift operators, relations among operators, Interpolation: Interpolation and extrapolation, data of equal and unequal intervals, Newton's forward and backward Interpolation formulae, Lagrange's interpolation formula, Fitting polynomials to the data by using Newton's and Lagrange's formulae, Inverse Interpolation by Lagrange's formula.

UNIT- II: NUMERICAL METHODS-2

Numerical Integration: Simpson's and Trapezoidal rules, Weddle's and Boole's rules of integrations; Numerical solutions of ordinary differential equations: Concepts of Initial Value Problem, Taylor's series method, Euler's method, Runge - Kutta method of fourth order; Predictor-corrector method: Milne's method to solve initial value problems.

UNIT-III: MULTIVARIABLE CALCULUS

Overview: Functions of two variables, limit and continuity, partial derivative and its geometrical meaning; Functions of several variables: Partial differential coefficients of higher order, total derivatives, Chain rules for partial differentiation, partial differentiation of Implicit functions; Jacobians: Jacobian and properties, chain rule, functional dependence, Jacobian of implicit functions

Maxima and Minima: Maxima and minima of a function of two variables, constrained maxima and minima, Lagrange's method of undetermined multipliers.

UNIT-IV: PARTIAL DIFFERENTIAL EQUATIONS -FIRST ORDER

Formation of PDEs: Elimination of arbitrary constants, Elimination of arbitrary functions; Solution concepts of PDEs: Complete solution / integral, particular integral, general integral and singular integral, PDEs solvable by direct integration; Linear PDEs of first order (Lagrange's linear equation): Method of grouping and method of multipliers; Nonlinear PDEs of first order: Solution methods of solving PDEs in standard forms I, II, III & IV (as is specified in Text Book 1).

UNIT-V: PARTIAL DIFFERENTIAL EQUATIONS -HIGHER ORDER

Homogeneous Linear Partial Differential Equations of second and higher order with constant coefficients: Symbolic form, Rules for finding complementary function, Rules

for finding particular integral, working procedure to get complete solution; Solving nonhomogeneous linear PDEs of second and higher order with constant coefficients; Method of separation of variables: concept of boundary value problem, solving boundary value problems by separating variables.

//Topics prefixed with 'outlines / overview' are not for assessment//

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017
2. T.K.V. Iyengar et al, Engineering Mathematics, S. Chand Publishers, Revised edition

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010
3. T. Veerarajan, Higher Engineering Mathematics, Tata McGraw-Hill, 2008

COURSE OUTCOMES: At the end of course, students shall be able to

CO1	Recall the concepts of numerical methods.
CO2	Recall the concepts of multivariable calculus.
CO3	Recall solution methods of PDEs.
CO4	Use the concepts of numerical methods to solve equations, do interpolation & numerical integration and also to solve ODEs numerically.
CO5	Use the concepts of multivariable calculus to find maxima & minima of a multivariable function.
CO6	Use solution methods of PDEs to solve BVPs.
CO7	Apply the concepts of numerical methods, multivariable calculus and PDEs to solve real world problems including BVPs.

CO/PO Mapping

Course Title:	MATHEMATICS-II (MEC,ECE,EEE,CHE & CIV)													
Course Code:	A2MAT102													
Course Designed by	Dept. of Mathematics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2							2			
CO2	3	3		2							2			
CO3	3	3		2							2			
CO4	3	3		2							2			
CO5	3	3		2							2			
CO6	3	3		2							2			
CO7	3	3		2							2			

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 06.07.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CYI101	SEMESTER - II	L	T	P	C
	ENGINEERING CHEMISTRY (Common to all branches)	3	--	2	5
	Total Contact Hours – 48				

SYLLABUS

UNIT 1: WATER TECHNOLOGY

Introduction –Soft Water and hardness of water, Estimation of hardness by EDTA Method - Boiler troubles - Industrial water treatment – specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, zeolite and ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.

UNIT 2: POLYMERS

Introduction to polymers, functionality of monomers, addition and condensation polymerization, copolymerization, stereospecific polymerization with specific examples. Thermoplastics and Thermo-sets – their differences.

Elastomers – applications with specific examples- Preparation, properties and uses of PVC, Bakelite, Teflon and Nylon-6, 6, Buna-S and Thiokol rubber- Fibre reinforced plastics – carbon fibre, glass fibre and aramids.

UNIT 3: ELECTROCHEMISTRY AND APPLICATIONS

Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations.
Primary cells –dry cell- Secondary cells – lead acid, nickel-cadmium and lithium ion batteries- working of the batteries including cell reactions- Fuel cells, hydrogen-oxygen, and methanol fuel cells – working of the cells.
Corrosion: Introduction to corrosion, mechanism of dry and wet corrosion, Pilling Bedworth ratios and uses, Types of corrosion – Differential aeration corrosion, galvanic corrosion, pitting corrosion, waterline corrosion and stress corrosion, Factors affecting the rate of corrosion – metal based factors and environmental based factors, protection techniques – metal coatings – galvanization and tinning, cathodic protection, inhibitors – cathodic and anodic, organic coatings – paints – constituents and their functions.

UNIT-4: CHEMISTRY OF ADVANCED MATERIALS

NANOMATERIALS: introduction- synthesis of Nano material by sol gel method- CVD- engineering applications of Nano materials

CEMENT: Introduction to ordinary Portland cement- manufacturing of OPC- setting and hardening of cement- decay of cement.

FUELS: Introduction- classification- liquid fuels- cracking- knocking- octane number and cetane number; Lubricants- definition- mechanism and properties of lubricants

UNIT 5: INSTRUMENTAL METHODS AND APPLICATIONS

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle, instrumentation (Block diagram and working), applications of UV, IR and NMR spectroscopic methods. Chromatography- introduction- Ion exchange chromatography- applications

COURSE OUTCOMES:

CO1: The student will have the ability to describe softening methods and desalination processes. He/ She will be able to explain various types of polymers; preparation, properties and engineering applications of thermoplastic, thermosetting plastics, rubbers and FRP's.

CO2: The student will have the ability to describe electrochemical reactions, principles of batteries, fuel cell and corrosion.

CO3: The student will have the ability to outline electromagnetic spectrum and explain the working principles of IR, UV, NMR and chromatographic techniques. The student describes the synthesis, properties and applications of nanomaterials, cement. HE/ She Outlines the cracking methods, knocking of fuels.

CO4: The student will have the ability to differentiate between hard and soft water, demineralization and deionization processes and thermosetting – thermoplastic materials.

CO5: The students will have the ability to give examples on primary and secondary batteries, various types of corrosion, methods of corrosion prevention.

CO6: The student will have the ability to draw inferences on the principles and applications of various instrumental methods and also can compare and contrast between cracking methods.

CO7: The student will have the ability to analyze water samples and validate the results obtained and apply their knowledge on polymers, batteries, materials and instrumentation.

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

Reference books:

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. H.Kaur, Instrumental Methods of chemical analysis, Pragathi Prakashan, 2012.
3. Chemistry for Engineers, Teh Fu Yen, Imperial college press, London

CO/PO Mapping

Course Title:	Engineering Chemistry													
Course Code:	A2CYI101													
Course Designed by	Dept. of Chemistry													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								2			1		
CO2	3								2			1		
CO3	3								2			1		
CO4	3								2			1		
CO5	3								2			1		
CO6	3								2			1		
CO7	3								2			1		

Course designed by	DEPARTMENT OF CHEMISTRY
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

Engineering Chemistry - Laboratory

List of Experiments:

1. Determination of HCl using sodium carbonate
2. Determination of Hardness of a groundwater sample.
3. pH metric titration of strong acid vs. strong base
4. Condcutometric titration of Strong acid VS Strong base
5. Condcutometric titration of Weak acid VS strong base
6. Potentiometric titration of Fe(II) with potassium dichromate
7. Determination of Strength of an acid in Pb-Acid battery
8. Preparation of a polymer
9. Determination of viscosity of polymer solution using survismeter
10. Determination of percentage of Iron in Cement sample by colorimetry
11. Estimation of Calcium oxide in port land Cement
12. Preparation of Nanomaterials (ex: Fe/ Zn/ Ferrite)
13. Adsorption of acetic acid by charcoal
14. Determination of acid value and saponification value of a given lubricant
15. Project based learning (Mandatory for all students)

Course Outcomes:

CO1: The student will be able to determine total hardness, strength of acid in a lead acid battery, calcium in Portland cement using volumetric analysis

CO2: The student will be able to explain condcutometric, potentiometric, pH metric titrations and colorimetric determination.

CO3: The student will be able to explain the synthesis of a polymer, nanomaterials

CO/PO Mapping

Course Title:	Engineering Chemistry													
Course Code:	A2CYI101													
Course Designed by	Dept. of Chemistry													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		1			1				1	1	2		
CO2	3		1			1				1	1	1		
CO3	3		1							1	1	1		

Course designed by	DEPARTMENT OF CHEMISTRY
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2EEI201	SEMESTER – II	L	T	P	C
	Basic Electrical Engineering **(Common to all branches)**	**3**	**1**	**2**	**5**
	Total Contact Hours – 50				

SYLLABUS

UNIT 1: D.C. CIRCUITS

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, Analysis of simple circuits with DC excitation, Superposition, Thevenin's and Norton's Theorems, Time-domain analysis of first-order RL and RC circuits.

UNIT 2: A.C. CIRCUITS

Representation of sinusoidal waveforms, Average and RMS values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase AC circuits (Series & Parallel), Resonance, Three-phase balanced circuits, voltage and current relations in star and delta configurations.

UNIT 3: DC & AC MACHINES [ELEMENTARY TREATMENT ONLY]

Principle and operation of DC Generator - EMF equation – open circuit characteristic of DC shunt generator – principle and operation of DC Motor – Types of DC Motors – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of single-phase Transformer - OC and SC tests on transformer - principle and operation of single phase & Three phase Induction Motors, construction and working of synchronous motors

UNIT 4: BASICS OF POWER SYSTEMS:

Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.

UNIT 5: ELECTRICAL INSTALLATIONS

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Types of Batteries, Characteristics of Batteries. Elementary calculations for energy consumption, power factor improvement, battery backup.

TEXT BOOK/ REFERENCES:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010
2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
3. Vincent Del Toro, "Electrical Engineering Fundamentals", Pearson, 2015.

COURSE OUTCOMES:

At the end of the course, Student will be able to

CO1. To recall fundamental concepts of electrical circuits such as charge, voltage, current and power.
CO2. Describe the principle of operation of D.C. & A.C. machines.
CO3. Outline the working operation of various generating stations.
CO4. Explain the procedure for solving circuits with A.C and D.C. Excitation
CO5. Summarize the performance characteristics of different machines.
CO6. Explain about different equipment used in power industry
CO7. Apply the fundamental laws, associated with Basic Electrical Engineering to solve real world problems in the field of Engineering

CO/PO Mapping

CO / PO mapping	Program Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
To recall fundamental concepts of electrical circuits such as charge, voltage, current and power.	3	3	1	1			3			1			1	1
Describe the principle of operation of D.C. & A.C. machines.	3	2	2	2	2					1			1	1
Outline the working operation of various generating stations.	3	3	3	1	1		1			1			1	1
Explain the procedure for solving circuits with A.C and D.C. Excitation	3	3	2	1	1		2			1			1	1
Summarize the performance characteristics of different machines.	3	3	2	1	1	3	1			1			1	1
Explain about different equipment used in power industry	3	3	2	1		2	2			1		1	3	2
Apply the fundamental laws, associated with Basic Electrical Engineering to solve real world problems in the field of Engineering	3	3	3	3	3	2	2			2		3	3	3

Course designed by	Department of Electrical & Electronics Engineering
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

Basic Electrical Engineering Laboratory

LIST OF EXPERIMENTS

Basic safety precautions, Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope, resistors, capacitors and inductors.

1. Verification of Kirchhoff laws.
2. Verification of Network Theorems.
3. Magnetization characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. Predetermination of performance parameters of 1 – Phase Transformer.
6. I – V Characteristics of Solar PV cell
7. Brake test on DC Shunt Motor.
8. Measurement of earth resistance.
9. Measurement of reactive power in three phase balanced circuit.
10. Measurement of Choke coil parameters
11. Brake test on 3 - Phase Induction Motor.
12. Determination of AC quantities using CRO/DSO.
13. I – V characteristics of battery.

COURSE OUTCOMES:

At the end of the course, Student will be able to

CO 1. Identify common electrical equipment used in laboratory.(L1)

CO 2. Estimate the ratings of different equipment used to perform an experiment. (L2)

CO 3. Demonstrate the usage of various electrical measuring instruments.(L3)

CO 4. Analyze the characteristics of rotating & stationery electrical machines (L4).

CO 5. Interpret the characteristics of PV cell and Battery.(L5)

CO/PO Mapping

CO / PO Mapping	Program Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
Identify common electrical equipment used in laboratory.	3		1	1	3	1			3	2	2	2	2	1
Estimate the ratings of different equipment used to perform an experiment.	3	2	3	3	3	2	1		3	3	2	2	2	3
Demonstrate the usage of various electrical measuring instruments.	2	2	2	2	3	1			3	3	1	2	2	1
Analyze the characteristics of rotating & stationery electrical machines.	3	3	3	3	2				3	3		2	3	2
Interpret the characteristics of PV cell and Battery.	3	3	3	3	3		1		3	3	2	2	3	3

Course designed by	Department of Electrical & Electronics Engineering
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2EHL001	SEMESTER - II	L	T	P	C
	Essential Communication in English	1	-	3	3
	Total Contact Hours – 60				

SYLLABUS

UNIT – I: BASIC LANGUAGE SKILLS – A REFRESHER

Organs of Speech: Consonant Sounds &Vowel Sounds; Phonemic Transcription; Using a Dictionary to know the Pronunciation of a word

Presenting Oneself: Introducing oneself -Using different expressions in Formal&Informal Contexts.

Reading a News Article: Identifying the key words and their usage; summarizing the information

Word Study & Mind Mapping: Root words–Derivatives; Homonyms, Homographs, Homophones; Synonyms & Antonyms

UNIT – II: RUDIMENTS OF FUNDAMENTAL COMMUNICATION

The World: Listening & watching Documentaries on World famous Places.

Describing People, Places and Life experiences: Physical Description- Describing someone's qualities – Usage of Jargon to present topography.

Short Story Corner: Reading a short story – Understanding the mood and essence – Sharing different perspectives.

Sentence Patterns: Concord – Rules – Common errors in day-day usage

UNIT-III: COMMUNICATION AT PRACTICE

Oratory Skills: Listening to World's Famous Speeches

JAM (Just a Minute) Talk: Format & Delivery Techniques

Nuances of Language: Company Description –Position Description (Formal) – processes like Chocolate Making(Informal)**.**

Types of Sentences – Declarative, Interrogative, Assertive etc.

UNIT-IV: COMMUNICATION THROUGH CONCEPTUAL LEARNING

BBC English: Watching interviews of Famous people.

Dialogue Practice: Situational Dialogues; Structuring a Role Play

New Inventions: Reading about latest technology pertaining to different fields (Source : Science Journals)

Transformation of sentences: Active Voice-Passive Voice**,** Direct & Indirect Speech**,** Degrees of Comparison**,** Simple Compound & Complex Sentences.

UNIT – V: COMMUNICATION THROUGH LIFE SKILLS

Watching Movies for Language Enrichment & Writing Reviews.

Skits: Enacting a Skit on a Social Issue

Reflections: Reading News Paper Editorial columns, Literacy Reviews, Poetry

Presenting an autobiography: Exploring different styles of writing autobiographies and evolving an own style**.**

TEXT BOOK:
Reference Source Compilation by the Department

REFERENCES:
1. **Fundamentals of Technical Communication** by Meenakshi Raman,OUP.
2. **Living English Structure** by W.Stannard Allen, Pearson Publications.
3. **English Made Easy** by Mary Margaret Hosler, Mc Graw Hill.
4.. **English and Communication Skills for Students of Science and Engineering**, by Dhanavel, S.P. Orient Blackswan Ltd.
5. **The Oxford Guide to Writing and Speaking** by John Seely , OUP

COURSE OUTCOMES:

CO1. Student will be able to come to terms with the basic language Skills required to cater to the requirement of the programme undertaken.

CO2. Student will be able to comprehend and analyze the core concepts well.

CO3. Student will be able to gain proficiency in all four skills of Language – Listening, Reading, Speaking and Writing.

CO4. Student will be able to understand the Syntactical and Grammatical Components of English Language and their correct use.

CO5: Student will be able to present his/her ideas confidently in a Professional manner.

CO/PO Mapping

Course Title:				**Essential Communication in English**										
Course Code:				A2EHL001										
Course Designed by				Dept. of English & Humanities										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2		2	3	3		3		
CO2						2		2	3	3		3		
CO3						2		2	3	3		3		
CO4						2		2	3	3		3		
CO5						2		2	3	3		3		

Course designed by	DEPARTMENT OF ENGLISH & HUMANITIES
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CHW201	SEMESTER - II	L	T	P	C
	Work Shop (Chemical Engineering)	**0**	**0**	**3**	**2**
	Total Contact Hours – 45				

COURSE OBJECTIVES	
1	To determine the flow regimes in a pipe flow.
2	To understand the significance of thermal conductivity and diffusivity
3	To understand the factors affecting the rate of reaction
4	To understand the difference between classification and clarification
5	To understand the parameters affecting ground and surface water
6	To understand the significance of diffusivity
7	To understand the factors affecting solubility

List of experiments

1. Distinguish between Laminar and turbulent flows – concept of Reynolds number
2. Use of manometers (different manometric fluids) to measure pressure drop – relate the pressure drop to fluid properties – express pressure in the height of a liquid (different) column – atmospheric pressure measurement
3. Measurement of fluid flow (liquids and gases) by different instruments
4. Determination of thermal conductivity of a metal rod.
5. Dissolution of solid in a liquid –identify the variables effecting the rate of dissolution
6. Diffusion of a solid in gas – factors effecting the rate – concepts of mass transfer
7. Estimation of half-life time (fractional life) of a chemical reaction (Hydrolysis of tertiary butyl chloride)
8. Estimation of chemical and physical parameters of ground and surface water like pH, TDS, conductivity.
9. Analysis of different oils to find acid value
10. Preparation of soap

Text book:

1. Unit Operations in Chemical Engg by W.L. McCabe and J.C. Smith and P Harriott, Mc Graw Hill 7th ed. 2005.

2. Mass Transfer Operations by R.E.Treybal, Mc. Graw Hill, 7th ed.

Reference books:

1. Brown G. G., "Unit Operations", CBS publishers.
2. Coulson J. H. and Richardson J.F., "Chemical Engg, Vol. I", 5th Ed., Butterworth-Heinemann.
3. Coulson J. H. and Richardson J.F., "Chemical Engg, Vol. II", 5th Ed., Butterworth-Heinemann.

Course Outcomes (CO)

Students will be able to

- Distinguish between laminar flow and turbulent flow based on Reynolds number.
- Determination of flow rates by U tube manometer.
- Determine the conversion of a chemical reaction.
- Characterize the solid particles.
- Estimate the chemical and physical parameters of ground and surface water such as pH, TDS, conductivity, hardness, turbidity and fluoride.
- Understand the magnitude of thermal conductivity
- Determination of solubility of solid in a liquid.

A2CHW201 Work Shop														
Course Outcomes	Program Outcomes													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PS O1	PS O2
CO1	3	1							3	2		2	1	1
CO2	3	2							3	2		2	1	1
CO3	3	2							3	2		2	1	1
CO4	3	2							3	2		2	1	1
CO5	1	1							3	2		2	1	1
CO6	3	1							3	2		2	1	1
CO7	3	1							3	2		2	1	1

A2CHW201 Work Shop	
Course designed by	Department of Chemical Engineering
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019.
	Ratified by: 5th Meeting of Academic Council held on 13.07.2019.

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B.Tech(IT)

MAHARAJ VIJAYARAM GAPATHI RAJ COLLEGE OF ENGINEERING(AUTONOMOUS)
Vijayaram Nagar Campus, Chintalavalasa, Vizianagaram-535005, Andhra Pradesh
Accredited by NAAC with 'A' Grade & Listed u/s 2(f) & 12(B) of UGC
(Approved by AICTE, New Delhi and Permanently Affiliated by JNTUK-Kakinada)
NBA Accredited UG Courses: B.Tech(MEC), B.Tech(CIV), B.Tech(EEE), B.Tech(ECE), B.Tech(CSE), B.Tech(IT), B.Tech(MEC) & B.Tech(CHE) and PG Course: MBA

ACADEMIC REGULATIONS & CURRICULUM

Applicable to the students admitted from the Academic Year 2019-2020

INFORMATION TECHNOLOGY

(B.Tech. Programme)

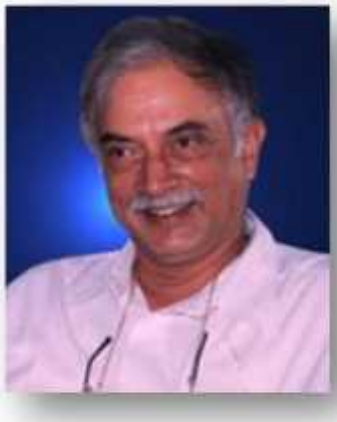
MAHARAJ VIJAYARAM GAJAPATHI RAJ COLLEGE OF ENGINEERING
(Autonomous)

(Approved by AICTE, New Delhi, and permanently affiliated to JNTUK, Kakinada)
Listed u/s 2(f) & 12(B) of UGC Act 1956.
Vijayaram Nagar Campus, Chintalavalasa,Vizianagaram-535005, Andhra Pradesh

The visionaries

Late Dr. P V G Raju
Raja Saheb of Vizianagaram
Founder Chairman-MANSAS
Ex-Minister for Education and Health, Govt. of AP
Ex Member of Parliament

Late Dr. P. Anand Gajapathi Raju
Ex-Chairman-MANSAS
Ex-Minister for Education and Health
Govt. of AP
Ex Member of Parliament



P. Ashok Gajapathi Raju
Chairman-MANSAS
Ex-Union Minister for Civil Aviation,
Govt. of India
Ex-Minister for Finance, Govt. of AP

Vision

Maharaj Vijayaram Gajapathi Raj College of Engineering strives to become a centre par excellence for technical education where aspiring students can be transformed into skilled and well-rounded professionals with strong understanding of fundamentals, a flair for responsible innovation in engineering practical solutions applying the fundamentals, and confidence and poise to meet the challenges in their chosen professional spheres.

Mission

The management believes imparting quality education in an atmosphere that motivates learning as a social obligation which we owe to the students, their parents/guardians and society at large and hence the effort is to leave no stone unturned in providing the same with all sincerity. Towards that end, the management believes special focus has to be on the following areas:

M1: Have on-board staff with high quality experience and continuously updating themselves with latest research developments and sharing that knowledge with students.

M2: Having a well stream-lined teaching learning process that is continuously assessed for effectiveness and fine-tuned for improvement.

M3: Having state-of-the-art lab and general infrastructure that gives students the necessary tools and means to enhance their knowledge and understanding.

M4: Having a centralized department focused on improving placement opportunities for our students directly on campus and coordinating the training programs for students to complement the curriculum and enhance their career opportunities.

M5: Having advanced research facilities and more importantly atmosphere to encourage students to pursue self-learning on advanced topics and conduct research.

ABOUT THE INSTITUTION:

Maharajah Alak Narayan Society of Arts and Science (MANSAS) is an Educational Trust founded by Dr. (late) P.V.G Raju, Raja Saheb of Vizianagaram in the hallowed memory of his father Maharajah Alak Narayan Gajapati with a view to confound socio-economic inequalities in the Vizianagaram principality executing a trust deed on 12-11-1958 duly established Maharajah's College and other educational institutions in and around Vizianagaram. The Trust is a charitable one published under Section 6 a (1) of A.P Charitable and Hindu Religious Institutions and Endowment Act 30 of 1987.

The object of the Trust is to manage the properties of educational institutions under it and to promote and advance the cause of education in general, besides awarding scholarships to deserving students enabling them to undergo special training in science and industries in and out of India. The Trust has made an uncompromising contribution to the nation by presenting the stalwarts.

Trust offers KG to PhD level education in Arts, Sciences, Law, Pharmacy, Humanities Education, Engineering and Management and presently houses 13 Educational Institutions. MVGR College of Engineering is one of the 13 Institutes.

Other Institutions under MANSAS

1. M.R. HIGH SCHOOL 1857
2. M.R COLLEGE **(NAAC ACCREDITED)** 1879
3. M.R. COLLEGE OF EDUCATION 1950
4. M.R. WOMENS COLLEGE **(NAAC ACCREDITED)** 1962
5. M.R. GIRLS HIGH SCHOOL 1974
6. M.R. MODEL HIGH SCHOOL 1974
7. M.R. ENGLISH MEDIUM SCHOOL 1979
8. M.R.V.R.G.R LAW COLLEGE 1987
9. M.R. P.G. COLLEGE **(NAAC ACCREDITED)** 1987
10. M.R.SCHOOL OF MANAGEMENT STUDIES 1994
11. M.R.V.R.G.R – II MEMORIAL JR. COLLEGE 1994
12. M.R. COLLEGE OF PHARMACY 2004

Maharaj Vijayaram Gajapathi Raj (MVGR) College of Engineering was established in the year 1997 by Maharaj Alak Narayan Society for Arts and Sciences (MANSAS) to impart quality technical education. The Institution is located in lush green, serene and pollution free environment spread over 60 acres of land in Chintalavalasa village situated in the outskirts of Vizianagaram, a fort city in the north coastal region of Andhra Pradesh.

Institution at a glance:

- MVGR is a 22 years old institution, established in 1997
- All eligible UG Programs (CHEMICAL, CIV, CSE, ECE, EEE, IT & MECHANICAL) were reaccredited by NBA.
- MBA program was also re-accredited by NBA.
- Had been re-accredited with Grade 'A' by NAAC of UGC
- Has Permanent affiliation with JN Technological University-Kakinada
- Listed under sections 2(f) & 12(b) of UGC act 1956.
- Approved by AICTE-New Delhi
- EIGHT departments are recognized as RESEARCH CENTERS by JNTU-K
- Granted Autonomy by UGC in 2015
- Campus of 60 acre
- Offering 7 UG and 5 M.Tech., and 1 MBA program
- About 250 faculty of which 84 Ph.D. Degree holders
- 83 Laboratories with an investment of about 13 Crores
- Total built up area of about 7 Lakh Sft
- About 42,000 volumes and Access to 8 international online journal packages like IEEE, SPRINGER, etc.
- 1420 Systems & 395 Mbps band width internet facility
- About Rs. 4 Crore worth of on-going R&D projects
- Actively involved in civil engineering consultancy work as Third Party Quality Auditor for Vizianagaram Municipality
- WIPRO Recognized technology learning center and MISSION 10X partner institution
- Recognized National Instruments Academy for Training in LabView
- SIRO Recognition by DSIR
- Recognized PTC Centre of Excellence for Creo Training
- Identified by MSME as Business Incubation Centre
- APSSDC-Siemens Technical Skill Development Institute
- Recognized CMs SKILL EXCELLENCY CENTER (SEC)
- Microsoft Ed-vantage Platinum Partner
- Institutional member of IUCEE
- Institutional Member of CII
- Member, Chamber of Commerce, Vizianagaram
- Green Campus award by Govt. of AP

MVGR College of Engineering is rated as one among the best engineering colleges in the state of Andhra Pradesh as it set up highest standards in all areas of curricular, co-curricular and extra-curricular activities and in students' placements. Based on industry and expert's feedback, the college is updating the curriculum from time to time. The college offers many value added add-on courses students and conducts training programs to meet the industries' requirements.

Academic Regulations for B.Tech., Program

Applicable to the students admitted from the Academic year 2019-2020 onwards.

1. PROGRAM STRUCTURE:

B.Tech.:

Sl. No	Category	Credits
1	Humanities and Social Sciences including Management courses	12
2	Basic Science courses	25
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	26
4	Professional core courses	54
5	Professional Elective courses relevant to chosen specialization/branch	18
6	Open subjects – Electives from other technical and /or emerging subjects	12
7	Project work, seminar and internship in industry or elsewhere	13
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	0
	Total	160

- Open electives offered by the parent department are listed in the course structure and are offered to students of other programs. The students of parent departments may also opt the course, provided it shall not be listed in the curriculum.
- For audit course a student is deemed to satisfy the minimum contact hours, as prescribed by the department and shall also comply with the requirements for submission of assignments/projects. A student shall also opt for MOOCs and submit the certificate.

1. HSS Courses		
Sl. No.	Subject	Credits
1	English -1	3
2	English -2 (Technical English)	3
3	Elective-1 (Management Related course (MEFA or MS or Operations Research)	3
4	Elective-2 (Professional Ethics and Human Values)	3
	Total	**12**

2. Basic Science Courses		
Sl. No.	Subject	Credits
1	Mathematics-I	3
2	Mathematics-II	3
3	Mathematics-III	3
4	Mathematics-IV	3
5	Applied / Engineering Physics (Theory + Lab)	5
6	Engineering Chemistry (Theory + Lab)	5
7	Biology for Engineers	3
	Total	**25**

3. Engineering Science Courses		
Sl. No.	Subject	Credits
1	Programming for Problem Solving (Theory + Lab)	5
2	Internet of Things (IOT)	3
3	Computer aided Engineering Graphics	3
4	Basic Electrical Engineering (Theory + Lab)	5
5	Department wise Engineering Science Course-I (AI Tools , Techniques & Applications)	5
6	Department wise Engineering Science Course-II (Design thinking and Product Innovation)	3
7	Workshop (Department Specific)	**2**
	Total	**26**

	Subjects	Credits
4	**Professional Core Courses**	54
5	**Professional Elective Courses Relevant to Chosen Specialization/Branch**	18
6	**Open Subjects – Electives from other Technical and / or Emerging Subjects**	12
		84

7. Project		
Sl. No.	Subject	Credits
1	Socially Relevant Project	1
2	Mini Project	2
3	Project Phase - I	2
4	Project Phase - II	8
	Total	**13**

8. Audit Courses (Non Credit Course)		
Sl. No.	Subject	
1	Induction Program	
2	Constitution of India	
3	Indian Traditional Knowledge	
4	Environmental Science	

BOS Chairman shall notify the list of MOOCs offered (Open Elective & Professional Elective) in the beginning of the semester.

2. PROGRAM PATTERN:

B.Tech.: The program is for 4 academic years / 8 semesters.

B.Tech. (Lateral Entry): The program is for 3 academic years / 6 semesters.

3. AWARD OF DEGREE:

B.TECH:

A student will be declared eligible for the award of degree if he/she fulfills the following academic regulations.

a) A student shall be declared eligible for the award of degree, if he/she pursues a course of study for not less than four academic years and not more than eight academic years from the date of admission.

b) The student shall register for **160** credits and secure all **160** credits.

c) A student shall also register and successfully complete audit programs (Non-credit) as recommended by Academic Council.

d) A student on completing 1st year class work may opt for a break of 1 year which shall be deemed as GAP year, as recommended by APSCHE, for undertaking successful entrepreneurial ventures.

e) Students who fail to complete Four Years Course of study within 8 years shall forfeit their seat and their admission shall stand cancelled.

B.TECH (Lateral Entry):

A student will be declared eligible for the award of degree on fulfilling the following academic requirements.

a) A student shall be declared eligible for the award of the degree, if he/she pursues a course of study for not less than three academic years and not more than six academic years.

b) The student shall register for **126** credits and secure all **126** credits.

c) A student shall also register and successfully complete audit programs (Non-credit) as recommended by Academic Council.

d) Students who fail to complete their three Years Course of study within 6 years shall forfeit their seat and their admission shall stand cancelled.

e) Student shall register for bridge programs, if any, as administered by the respective departments at the beginning of 2nd year and successfully complete as per the guidelines of the Institution.

4. CERTIFICATION PROGRAMS:

Sl. No.	Dept.	Name of the Program
1	MECH	Windchill 10.2 PDM by Adroitec Engineering Solutions Pvt. Ltd., Hyderabad
2	MECH	Creo 2.0 by PTC
3	MECH	Edgecam by Verosoft, UK
4	MECH	ANSYS Training and Certification by Mechanical Department
5	MECH	AUTOCAD Training and Certification by Mechanical Department
6	MECH	Catia by APSSDC-Dassault Systems, CM's Center of Excellence
7	MECH	Delmia by APSSDC-Dassault Systems, CM's Center of Excellence
8	MECH	Simulia by APSSDC-Dassault Systems, CM's Center of Excellence
9	MECH	2-Wheeler Automobile Certification by APSSDC-SIEMENS
10	MECH	4-Wheeler Automobile Certification by APSSDC-SIEMENS
11	MECH	Welding Certification by APSSDC-SIEMENS
12	MECH	CNC Certification by APSSDC-SIEMENS
13	MECH	Commercial Electrical Certification by APSSDC-SIEMENS
14	MECH	Solid Edge Certification by APSSDC-SIEMENS
15	CHEM	Chemical Process Design and Simulation by Simtech Simulations, Hyderabad
16	ECE	Embedded Systems by Think LABS, Mumbai
17	ECE	Labview by National Instruments Systems India Pvt. Ltd.
18	ECE	Unified Technology Learning Program (UTLP) by Wipro Mission 10X
19	CSE, IT	PEGA by Virtusa Corporation
20	CSE, IT	Microsoft technologies by Microsoft Corp.
21	CSE, IT	Ethical Hacking by EC-Council Academia
22	CSE, IT	Java and C by Talent Sprint
23	CSE, IT	Network Analyst (CCNA) by Cisco Systems Inc
24	CSE, IT	Java Programming (OCJP) and DBMS by Oracle
25	EEE	PLC, Drives and Automation by Siemens
26	EEE	PLC by New Dawn Automation
27	EEE	Home Electrical Certification by APSSDC-SIEMENS
28	Civil	Remote Sensing and GIS by Indian Institute of Remote Sensing

a) The Institution shall offer the certification programs by itself or in collaboration with industry/such other Institutions deemed to have specialized expertise in the proposed area of training.
b) Only students of the Institution shall be eligible to register on payment of prescribed fee.
c) However, subject to availability of resources and the demand the Institution may offer the program to external candidates meeting the pre-qualification requirements and in the order of the merit.
d) The duration of the course and design of the content shall be done by the respective departments of the Institution by themselves or in collaboration with industry/such other institutions deemed to have specialized expertise in the proposed area of training.
e) If the duration of the course is less than or equal to 40 hours, it can be completed in one semester, otherwise, it can suitably distributed over a number of semesters.
f) Mere enrolment/registration for the program shall not entitle any claim for award of certificate.
g) A candidate shall be deemed eligible for the award of the certificate if he/she
   - Attends at least 75% of scheduled training sessions
   - Complies to all the requirements of submission of the assignments, presentations, seminars, projects, etc., and also appears for periodic tests.
   - Shall attain minimum levels of performance in tests as prescribed.
   - Shall remit such fee as deemed fit for the certification
   - A candidate registered and failed to meet the requirements shall be permitted to repeat the said training one another time after remitting 25% of the fee fixed for the program as re-registration fee.

If the student is absent for the periodic tests, the test shall be re-conducted on payment of 10% of fee.

5. COURSES OFFERED:

Name of the Program	Degree
UG Programs (Engineering & Technology)	B.Tech. (Civil) B.Tech. (EEE) B.Tech. (Mech.) B.Tech. (ECE) B.Tech. (CSE) B.Tech. (CHEM) B.Tech. (IT)
PG Programs (Engineering & Technology)	M.Tech. (Structural Engineering) M.Tech. (Power Systems) M.Tech. (PDM) M.Tech. (VLSI) M.Tech. (CN&IS)
Other PG Programs	MBA
Research Programs	Ph.D. in Civil, EEE, MECH, ECE, CSE, CHEM, MBA and MATHS

6. DISTRIBUTION AND WEIGHTAGE OF MARKS:

B.Tech.:

a). All Theory courses will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment:

Subjective tests	- 20 Marks
Objective tests	- 10 Marks
Assignments	- 10 Marks

- Two subjective tests shall be conducted.
- Each subjective test shall be conducted for 90 Minutes and have 3 questions each for 7 marks (No choice) and the same shall be scaled down to 20 Marks.
- Average of two subjective tests shall be considered.
- Two objective tests (online) shall be conducted each for 20 marks.
- Each objective test shall be conducted for 20 minutes and have 20 Multiple Choice Questions each for 1 mark and the same shall be scaled down to 10 Marks.
- Average of two objective tests shall be considered.
- Assignments shall be assessed for 10 marks.

External Assessment:

- External examination is for 60 marks (180 min). Question paper contains 10 questions (2 questions from each unit) and each question carries 12 marks. Student shall answer 5 questions (1 question from each unit).

b). **Laboratory/Practice:**

All Laboratory/Practice courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

- Continuous assessment for 15 marks for each experimental session finally averaged to 15 marks.
- Project based learning shall be assessed for 15 Marks.
- In Project based learning, a student has to identify a problem such that at least 3 or 4 modular learning of experiments shall be integrated and submit comprehensive report with solution at the end of the semester.
- An internal assessment test conducted at the end of the semester shall be assessed for 10 marks.

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Both internal and external examination shall include assessment of the student on
    a) Knowledge of principles/concepts involved
    b) Experimental design
    c) Result interpretation and analysis
    d) Experimental report

c). **Drawing/Design/Estimation:**

i) Computer Aided Engineering Graphics:

Evaluation Procedure:

The course will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Question paper contains 3 questions (with internal choice). **E**ach question carries 20 marks (5 marks for free hand drawing and list of commands & 15 marks for final drawing prepared in AUTOCAD). A Student shall answer all questions.

ii) Modeling and Assembly of Mechanical Elements:

Evaluation Procedure:

The course will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment : (40 Marks)

Continuous assessment	: 15 Marks
Project based learning	: 15 Marks
Internal test	: 10 Marks

Semester End Assessment:

- Semester end examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Semester End Examination shall include assessment of the student on Final drawings like modeling, assembly and drafting.
- Student is expected to execute one exercise.
- Final drawings like modeling, assembly and drafting hard copies shall be evaluated by both internal and external examiners

Integrated Course (Theory + Lab):

Theory and Lab shall be assessed for 200 Marks (Each 100 marks)

- For Integrated course, the theory shall be assessed for 100 marks, of which 40 marks for internal assessment and 60 marks for semester end external examination.
- The Lab shall be assessed for 100 marks , of which, 40 marks for internal assessment and 60 marks for semester end external examination

Socially Relevant Project:

- A student shall identify and provide a solution to the problem relevant to society/Profession/Industry.
- A student shall engage at least 15 hours on socially relevant project. Socially relevant project shall be evaluated internally for 50 marks by Project Review Committee (PRC). PRC comprising of HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide shall review the progress.

Mini Project:

- A student shall undergo internship for a period of 4 weeks/provide solution to the problem relevant to Industry/ Modern tool during the vacation after VI semester and submit comprehensive report.
  - Mini project shall be evaluated internally for 50 marks by Project Review Committee (PRC).
  - PRC shall prepare rubrics for assessment.

Project Evaluation:

Project is divided into 2 phases – Phase I & Phase II

- Evaluation shall comprise of internal and external assessment.
  Internal: 110 (Phase I 50 marks, Phase II 60 Marks)
  External: 90
- A project Review committee (PRC) comprising of HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide shall review the progress once in four weeks.

Project Phase I:

- Project Phase I shall be evaluated internally by PRC for 50 Marks.
- A student shall undertake project phase I during the VII semester.
- A student shall report to the guide/external supervisor and work under his supervision at least 2 hours per week.
- Assessment shall be on
  - Literature review
  - Identification and statement of the Problem

Project Phase II:

- A student shall undertake project phase II during the VIII semester.
- A student shall report to the guide/external supervisor and work under his supervision at least 8 hours per week.
- Internal evaluation shall be done by HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide for 60 marks.
- External evaluation shall be done by HoD, Guide/Internal Examiner and External Examiner for 90 marks.
- Assessment shall be on
  a) Review on fundamental knowledge involved
  b) Inter disciplinary aspect
  c) Experimental/methodology design
  d) Result analysis and interpretations
  e) Report writing
  f) Team work
  g) Presentation
  h) Viva-voce

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2^{nd}, 3^{rd} and 4^{th} years of study shall be same as applicable to regular B.Tech students.

7. ATTENDANCE REGULATIONS:

B.Tech.:

I. A student shall be eligible to appear for end semester examinations, if he or she acquires a minimum of 75% of attendance in aggregate of all the subjects (Theory & Lab.) for the semester.
II. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the college academic committee.
III. Shortage of attendance below 65% in aggregate of all the subjects (Theory & Lab) for the semester shall not be Condoned.
IV. Detained student shall seek re- admission for that semester when offered within 4 weeks from the date of commencement of class work.

PROMOTION RULE (Based on attendance):

- A Student shall be promoted to the next semester on fulfillment of minimum attendance requirement (75%) of current semester.

PROMOTION RULE (Based on credits):

- A student shall be promoted from IV semester to V semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to IV semester from the following examinations irrespective of whether the candidate takes the examination or not.
    - Two regular and Two supplementary examinations of I semester
    - Two regular and One supplementary examinations of II semester
    - One regular examination and One supplementary examination of III semester
    - One regular examination of IV semester.

- A student shall be promoted from VI semester to VII semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to IV semester from the following examinations irrespective of whether the candidate takes the examination or not.
    - Three regular and Three supplementary examinations of I semester
    - Three regular and Two supplementary examinations of II semester
    - Two regular and Two supplementary examinations of III semester
    - Two regular and One supplementary examinations of IV semester
    - One regular and One supplementary examination of V semester
    - One regular examination of VI semester.

B.TECH (Lateral Entry):

PROMOTION RULE (Based on attendance):

A Student shall be promoted to the next semester on fulfillment of minimum attendance requirement of current semester.

PROMOTION RULE (Based on credits):

A student shall be promoted from VI semester to VII semester if he fulfills the minimum attendance requirement (75%) and academic requirement of 40% of credits up to VI semester from the following examinations irrespective of whether the candidate takes the examination or not.

- Two regular and Two supplementary examinations of III semester
- Two regular and one supplementary examinations of IV semester
- One regular and One supplementary examinations of V semester
- One regular examination of VI semester.

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2nd, 3rd and 4th years of study shall be same as applicable to regular B.Tech students.

8. MINIMUM ACADEMIC REQUIREMENTS:

B.Tech.: (Theory/Lab)

i. A student is deemed to have satisfied the minimum academic requirements for a course on securing at least 24 marks out of 60 marks at semester end examination and overall minimum of 40 marks out of 100 marks including internal assessment.

ii. **Integrated Course (Theory + Lab):**

- The student shall secure minimum 24 marks out of 60 marks at semester end examination and overall 40 marks out of 100 marks for Theory and Laboratory courses independently. In case of failure in either theory or Laboratory course, the student should re-appear for both theory and laboratory.
- The assessment shall be done independently for both theory and laboratory courses and final marks shall be calculated on weighted average method for converting marks into grade points.

  Sample calculation:

  Integrated course-5 credits. Theory is for 3 credits and laboratory is for 2 credits.

  Total Marks obtained in theory: 70 out of 100 (3 Credits)

  Total Marks obtained in Lab : 90 out of 100 (2 Credits)

  Final marks of the integrated course is

  (70X3 + 90X2) / 5 = 78 Marks

B.Tech. (Lateral Entry):

The rules and regulations for candidates admitted under lateral entry category for 2nd, 3rd and 4th years of study shall be same as applicable to regular B.Tech students.

9. GRADING SYSTEM:

B.Tech. / B.Tech. (Lateral Entry)

Semester Grade Point Average (SGPA) for the current semester which is calculated on the basis of grade points obtained in all courses, except audit courses and courses in which satisfactory or course continuation has been awarded,

SGPA= Σ (course credits earned x Grade points) /
Σ (Total course credits in the semester.

CGPA= Σ (course credits earned x Grade points) up to successfully completed semesters / Σ (Total course credits up to successfully completed.

The UGC recommends a 10-point grading system with the following letter grades as

given below:

O	(Outstanding)	10
A+	(Excellent)	9
A	(Very Good)	8
B+	(Good)	7
B	(Above Average)	6
C	(Average)	5
P	(Pass)	4
F	(Fail)	0
Ab	(Absent)	0

- iii. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X10 = 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			**139**

Thus, **SGPA =139/20 = 6.95**

Illustration for CGPA

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
Credits: 16	Credits: 18	Credits: 25	Credits: 21	Credits: 23	Credits: 22
SGPA: 7.9	SGPA: 7.8	SGPA: 7.6	SGPA: 8.0	SGPA: 8.3	SGPA: 8.6

Semester 7	Semester 8
Credits: 21	Credits:14
SGPA: 8.2	SGPA: 8.5

Thus,

CGPA= $\frac{16x7.9 + 18x7.8 + 25x7.6 + 21x8.0 + 23x8.3 + 22x8.6 + 21x8.2 + 14x8.5}{160}$ = **8.1**

10. ELIGIBILITY FOR AWARD OF DEGREE:

B.Tech:

A student shall be eligible for award of the degree if he/she fulfills the following conditions:

1) Successfully completes all the courses prescribed for the Program.
2) CGPA greater than or equal to 4.5(Minimum requirement for Pass),

11. AWARD OF CLASS:

B.Tech:

Eligible Candidates for the award of B.Tech., Degree shall be placed in one of the following Classes based on CGPA.

Class	CGPA
Distinction	≥ 7.5
First Class	≥ 6.5
Second Class	≥ 5.5
Pass class	≥ 4.5

12. INSTRUCTION DAYS:

A semester shall have a minimum of 90 clear instruction days (including internal examinations).

13. Transfers from other Institutions shall not be permitted.

14. SUPPLEMENTARY EXAMINATIONS:

Supplementary examinations shall be conducted within 4 weeks from the date of announcement of results of regular examinations.

15. WITHHOLDING OF RESULTS: The result of a student shall be withheld

- If the student has not paid the dues, if any, to the institution
- If any case of pending disciplinary action ,
- Involvement in any sort of malpractices etc.
- Involvement in ragging.

16. TRANSITORY REGULATIONS:

A Candidate shall be readmitted from University regulations to A1 regulations or from A1 regulations to A2 regulations as per the guide lines of JNTUK.

17. AMENDMENTS TO REGULATIONS:

The Academic Council of MVGR College of Engineering (Autonomous) reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations, and/ or Syllabi or any other such matter relating to the requirements of the program which are compatible to the contemporary/emerging trends effectively meeting the needs of society/industry/stake holding groups.

18. Regulations for MALPRACTICES during the conduct of examinations

	Nature of Malpractices/Improper conduct	Punishment
1 (a)	If the candidate possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only. *
(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. *

2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled. *
3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider/candidate not on rolls, he will be handed over to the police and a case is registered against him. *
4	If the candidate mishandles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. Also if the answer script is mutilated / damaged disturbing the shape, of the script, answers, the bar code intentionally.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. He shall be debarred from class work and all examinations and be allowed to reregistered for the next subsequent odd or even semester only. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.*

5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	The same should be brought to the notice of CE who in turn in consultation with malpractice committee makes decision for cancellation of the performance in that subject. *
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. *
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. *
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. *

9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. *
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. *
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.*

*

19. General :

- Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
- The academic regulation should be read as a whole for the purpose of any interpretation.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

* * *

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

- ⇨ **Ragging within or outside any educational institution is prohibited.**
- ⇨ **Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student**

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	 2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	 10 Months	+	Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE MVGR A RAGGING FREE CAMPUS

Ragging

ABSOLUTELY NO TO RAGGING

1. **Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.**
2. **Ragging entails heavy fines and/or imprisonment.**
3. **Ragging invokes suspension and dismissal from the College.**
4. **Outsiders are prohibited from entering the College and Hostel without permission.**
5. **Girl students must be in their hostel rooms by 7.00 p.m.**
6. **All the students must carry their Identity Cards and show them when demanded**
7. **The Principal and the Wardens may visit the Hostels and inspect the rooms any time.**

PROGRAM STRUCTURE

B.Tech. (INFORMATION TECHNOLOGY)

Semester - I						
S. No	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	A2MAT101	Mathematics-I	3	-	-	3
2	A2PYI102	Applied Physics (Theory + Lab)	3	-	3	5
3	A2CII201	Programming for Problem Solving (Theory + Lab)	3	-	3	5
4	A2MED201	Computer Aided Engineering Graphics	1	-	4	3
5	A2EHA701	Constitution of India	2	-	-	0
						16
Semester - II						
S. No	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	A2MAT103	Mathematics-II	3	-	-	3
2	A2CYI101	Engineering Chemistry (Theory + Lab)	3	-	3	5
3	A2EEI201	Basic Electrical Engineering (Theory + Lab)	3	-	3	5
4	A2CIW201	Basic IT Tools Workshop	-	-	4	2
5	A2EHL001	English-I	1	-	3	3
						18
Semester - III						
S. No	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	A2CIT202	Design Thinking and Product Innovation	3	-	-	3
2	A2CIT301	Digital Logic Design	3	-	-	3
3	A2CII301	Data Structures	3	-	3	5
4	A2CII302	Programming with Python	2	-	3	4
5	A2XXT5XX	Open Elective-I	3	-	-	3
6	A2MAT104	Mathematics-III	3	-	-	3
7	A2MST001	Managerial Economics & Financial Analysis	3	-	-	3
8	A2EHA702	Indian Traditional Knowledge	2	-	-	0
						24

Semester - IV

S. No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2CII303	Database Management Systems	3	-	3	5
2	A2CII304	Object Oriented Programming	3	-	3	5
3	A2CIT302	Computer Organization & Architecture	3	-	-	3
4	A2XXT5XX	Open Elective-II	3	-	-	3
5	A2MAT108	Mathematics-IV	3	-	-	3
6	A2XXT1XX	Biology for Engineers	3	-	-	3
7	A2CHA701	Environmental Science	2	-	-	0
						22

Semester - V

S. No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2CII202	AI Tools, Techniques & Applications	3	-	3	5
2	A2CII305	Computer Networks	3	-	3	5
3	A2CIT303	Design & Analysis of Algorithms	3	-	-	3
4	A2CIT304	Operating Systems	3	-	-	3
5	A2CIT305	Automata Theory & Compiler Design	3	-	-	3
6	A2CIT4XX	Professional Elective-I	3	-	-	3
7	A2CIP601	Socially Relevant Project	-	-	2	1
						23

Semester - VI

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2CII306	Web Technologies	3	-	3	5
2	A2CIT306	Software Engineering	3	-	-	3
3	A2CIT307	Microprocessors & Interfacing	3	-	-	3
4	A2CIT4XX	Professional Elective-II	3	-	-	3
5	A2CIT4XX	Professional Elective-III	3	-	-	3
6	A2EHL002	English-II (Technical English)	3	-	-	3
7	A2CIP602	Mini Project	-	-	4	2
						22

Semester – VII						
S.No	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	A2CIT201	Internet of Things (IOT)	3	-	-	3
2	A2EHT001	Professional Ethics and Human Values	3	-	-	3
3	A2CIT308	Object Oriented Design & Analysis and Design Patterns	4	-	-	4
4	A2CIT4XX	Professional Elective-IV	3	-	-	3
5	A2CIT4XX	Professional Elective-V	3	-	-	3
6	A2CIT4XX	Professional Elective-VI	3	-	-	3
7	A2CIP603	Project Phase-I	-	-	4	2
						21
Semester – VIII						
S. No	**Course Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1	A2XXT5XX	Open Elective-III (MOOCs)	3	-	-	3
2	A2XXT5XX	Open Elective-IV (MOOCS)	3	-	-	3
3	A2CIP604	Project Phase - II	-	-	16	8
						14

ELECTIVE STREAMS (MAJORS)

CI-EG1 (Code-1) – Business Intelligence (A2CIT41X)	
Subject Code	**Subject**
A2CIT411	Data Warehousing & Mining
A2CIT412	Statistical & Predictive Analytics
A2CIT413	Data Analytics & Tools
A2CIT414	Machine Learning

CI-EG2 (Code-2) – Networks (A2CIT42X)	
Subject Code	**Subject**
A2CIT421	Routing and Switching Concepts
A2CIT422	Firewalls & VPN
A2CIT423	Penetration Testing
A2CIT424	Information Security and Management Standards

CI-EG3 (Code-3) – Architecture (A2CIT43X)	
Subject Code	**Subject**
A2CIT431	Service Oriented Architecture
A2CIT432	Middleware Technologies
A2CIT433	Block chain fundamentals
A2CIT434	.NET Technologies/EJB

CI-EG4 (Code-4) – Applications (A2CIT44X)	
Subject Code	**Subject**
A2CIT441	Bio-Informatics
A2CIT442	Digital Image Processing
A2CIT443	Digital Forensics & Investigations
A2CIT444	E-Commerce

Core Elective – V (A2CIT4XX)	
Subject Code	**Subject**
A2CIT411	Data Warehousing & Mining*
A2CIT421	Routing and Switching Concepts*
A2CIT431	Service Oriented Architecture*

Core Elective – VI (Code-6) (A2CIT46X)	
Subject Code	**Subject**
A2CIT461	Natural Language Processing
A2CIT462	Cryptography and Information Security
A2CIT463	Cloud Computing (Salesforce/Amazon)
A2CIT464	Enterprise Resource Planning
A2CIT433	Block chain fundamentals*

* *Cannot Opt if already completed*

GUIDELINES FOR CHOOSING THE CORE ELECTIVES

- A Student has an option to choose **ONE** among the following Streams as a Major Group and complete 4 courses listed that group as Core Electives I, II, III and IV from the respective group.

    1. Business Intelligence
    2. Networks
    3. Architecture
    4. Applications

- A Student has to choose any ONE from the list of courses in the table of Core Elective – V, which he has not studied earlier.
- A Student may choose any ONE among the courses Listed in Core Elective – VI table, which he has not studied earlier.

OPEN ELECTIVES (Code – 5)

The Open Electives offered by the departments of CSE & IT are as follows:

Subject Code	Subject
A2CIT501	Fundamentals of Data Structures
A2CIT502	Object Oriented Programming with JAVA
A2CIT503	Web Design & Development
A2CIT504	Python Programming
A2CIT505	NoSQL Databases
A2CIT506	Data Analytics

A2MAT101	SEMESTER - I	L	T	P	C
	MATHEMATICS-I (common to ALL branches)	3	0	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: LINEAR ALGEBRA-1

Rank of a matrix: Elementary row and column transformations, equivalent matrices, Echelon form of a matrix, calculation of rank by reducing the matrix to Echelon form. System of equations: Linear system of equations, homogeneous and non-homogeneous system of equations, consistency criteria, trivial and non-trivial solutions, solving system of equations by Rank method; Eigenvalues and Eigenvectors: Finding Eigenvalues and Eigenvectors, properties of Eigenvalues and Eigenvectors (statements) including spectral mapping theorem.

UNIT- II: LINEAR ALGEBRA-2

Cayley-Hamilton Theorem: Statement of the theorem and its verification. Applications: Finding higher powers of a matrix, finding matrix polynomials, finding inverse of matrix. Diagonal form of a matrix: Reduction to diagonal form, spectral and modal matrices, finding higher powers of a matrix using diagonalisation, Quadratic forms: Matrix form of quadratic forms, orthogonal transformation, canonical form, reduction of quadratic form to canonical form by orthogonal transformation method, rank, index, signature and nature (definiteness) of a quadratic form.

UNIT-III: FIRST ORDER DIFFERENTIAL EQUATIONS & APPLICATIONS

Outlines: Differential Equations(DEs), Order and degree of a DE, Formation of DEs, general solutions of a DE; Solving first order and first degree DEs: linear DEs, Bernoulli's DEs (reducible to linear), exact DEs, integrating factors, non-exact DEs (reducible to exact).

Applications to real world problems: Newton's law of cooling, laws of growth and decay, family of curves, orthogonality of families curves, orthogonal trajectories (Cartesian and polar curves).

UNIT-IV: HIGHER ORDER DIFFERENTIAL EQUATIONS

Differential equations of higher order: Linear differential equations of higher order, its operator form. Solution concepts: General (complete) solution, particular solution. Solution of linear differential equations of higher order: Auxiliary equations, rules for finding complementary functions, rules for finding particular integrals (general and special methods).

UNIT-V: LAPLACE TRANSFORMS

Laplace transformation: Laplace transformation of elementary functions, Properties: Linearity, change of scale, first shifting properties, finding Laplace transformations using properties, Advanced properties: Laplace transformations of derivatives and integrals, multiplication by t^n, division by t (statements), finding Laplace transformations

using advanced properties; Inverse Laplace transformations: Finding inverse Laplace transformations using partial fractions, statement of Convolution theorem, finding inverse Laplace transformations by Convolution theorem; Applications: Solving Initial Value Problems by using Laplace transformations.

//Topics prefixed with 'outlines / overview' are not for assessment//

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017
2. T.K.V. Iyengar et al, Engineering Mathematics, S. Chand Publishers, Revised edition

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010
3. T. Veerarajan, Higher Engineering Mathematics, Tata McGraw-Hill, 2008

COURSE OUTCOMES: Learners at the end of this course will be able to

CO 1	KO#1	Recall the concepts of Linear algebra
CO 2	KO#2	Recall the solution methods and applicability of first order differential equations
CO 3	KO#3	Recall the solution methods of higher order differential equations and the concepts of Laplace transforms
CO 4	UO#1	Use and interpret the concepts of linear algebra
CO 5	UO#2	Use and interpret solution methods and applicability of first order differential equations
CO 6	UO#3	Use and interpret solution methods of higher order differential equations and the concepts of Laplace transforms
CO 7	AO#1	Apply the concepts of linear algebra, differential equations and Laplace transformation to model and solve real world problems

CO/PO Mapping

Course Title:	Mathematics-I (Common to ALL Branches)													
Course Code:	A2MAT101													
Course Designed by	Dept. of Mathematics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2							2			
CO2	3	3		2							2			
CO3	3	3		2							2			
CO4	3	3		2							2			
CO5	3	3		2							2			
CO6	3	3		2							2			
CO7	3	3		2							2			

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 06.07.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PYI102	SEMESTER – I	L	T	P	C
	APPLIED PHYSICS (COMMON TO EEE, ECE, CSE & IT)	3	-	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: WAVE OPTICS [10hrs]

Interference: Introduction- Coherence– Young's double slit experiment- Theory of interference fringes- Interference in thin parallel film by reflection (under reflected light)- Newton's Rings- Applications.

Diffraction: Introduction **-** Fraunhofer diffraction at- Single slit– Double slit (qualitative)- Diffraction Grating.

Polarization: Introduction– Polarization by refection- Brewsters law- Double refraction– Nicol Prism– Theory of Plane, circular and elliptically polarized light – Quarter wave & Half wave plate

UNIT-II: MAGNETIC PROPERTIES OF MATERIALS [8hrs]

Introduction– Origin of Magnetic moment in atom– Classification of magnetic materials– Ferromagnetism- Weiss theory (qualitative)- Domain theory- Hysteresis- Soft & Hard magnetic materials- Ferrites- Garnets- Applications.

UNIT-III: DIELECTRIC PROPERTIES OF MATERIALS [8hrs]

Introduction– Types of Polarization- Electronic- Ionic- Orientation polarization– Internal field- Clausius Mossoiti relation- Frequency dependency of polarization- Dielectric loss- Loss Tangent- Ferro electricity- Piezoelectricity- P-E loop- Applications.

Unit-IV: HEAT TRANSFER [10hrs]

Transfer of heat energy- conduction, convection and radiation and their fundamental laws. Thermal expansion of solids and liquids - expansion joints -bimetallic strips. Heat conductions in solids- thermal conductivity - Forbe's and Lee's disc method: theory and experiment - applications (qualitative). Working principles of heat exchangers- refrigerators- ovens- solar water heaters.

UNIT–V: QUANTUM PHYSICS & SEMICONDUCTORS [12hrs]

Quantum Physics: Introduction- Matter wave– Davisson Germer Experiment- Schrodinger's wave equations– Wave function– Particle in potential box– Origin of energy bands.

Introduction- Intrinsic semiconductors– Carrier concentration (qualitative)– Electrical conductivity- Extrinsic semiconductors– Carrier concentration (qualitative)- Drift and Diffusion currents- Direct and Indirect band gap semiconductors- Light emitting diode– Solar cell- Hall effect- Applications.

TEXTBOOKS:

1. R.K.GAUR and S.L.GUPTA, Engineering Physics, Dhanpat Rai Publications

REFERENCES:

1. RESNICK, HALLIDAY and WALKER, Principles of Physics, Wiley Publishers
2. P.K. NAG, Heat and Mass Transfer, Mc Graw Hill Publishers.
3. B.K. PANDEY and S. CHATURVEDI, Engineering Physics, Cengage Learning Publishers.

COURSE OUTCOMES:

CO1. Student will be able to gain knowledge on basics of interference, diffraction and polarization of light.

CO2. Student will be able to gain knowledge on fundamentals of magnetic properties of materials and the polarization mechanisms of dielectrics.

CO3. Student will be able to gain knowledge on modes of heat transfer and the essentials of quantum physics & semiconductors for engineers.

CO4. The students will be able to understand and recognize the principle behind working of optical devices.

CO5. The students will be able to understand and recognize the underlying property behind working of electric and magnetic components in devices.

CO6. The students will be able to understand and recognize the importance of heat transfer and quantum mechanics based semiconductor devices.

CO7. The students will have the ability to apply the conceptual knowledge of principles of quantum physics in designing and developing engineering applications.

CO/PO MAPPING:

Course Title:	Applied Physics (Common to ECE, CSE & IT Branches)													
Course Code:	A2PYI102													
Course Designed by	Dept. of Physics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3						1				1		
CO2	3	3						1				1		
CO3	3	3						1				1		
CO4	3	3						1				1		
CO5	3	3						1				1		
CO6	3	3						1				1		
CO7	3	3						1				1		

Course designed by	DEPARTMENT OF PHYSICS
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PYI102	SEMESTER – I	L	T	P	C
	APPLIED PHYSICS LAB (COMMON TO EEE,ECE, CSE & IT)	-	-	3	2
	Total Contact Hours – 42				

LIST OF EXPERIMENTS

1.	Determination of the radius of curvature of the plano-convex lens by Newton's Rings method.
2.	Determination of the thickness of the thin object (hair/paper) by Wedge method.
3.	Determination of the prominent spectral line wavelengths in mercury spectrum by normal incidence method.
4.	Obtain the signature variation of the axial magnetic field for a circular coil carrying current.
5.	Estimation of the hysteresis loss for a ferromagnetic material.
6.	Determination of thermal conductivity coefficient of the disc shaped material.
7.	Determination of energy band gap of the semiconductor by using junction diode.
8.	To plot I/V Characteristics of Zener diode.
9.	Determination of temperature coefficient of the thermistor.
10.	To plot frequency response characteristics of the L.C.R series circuit.

TEXTBOOKS:

1. BALASUBRAMANIAN.S, SRINIVASAN.M..N, A Text book of Practical Physics, S Chand Publishers, 2017

REFERENCES:

1. https://vlab.amrita.edu.

COURSE OUTCOMES:

CO1. Design experiments to demonstrate and investigate the interference and diffraction patterns of light.

CO2. Design experiments for signature variation of magnetic field due to current and the hysteresis loss in magnetic materials.

CO3. Design experiment to determine the thermal conductivity coefficient (K) of a material.

CO4. Design L.C.R series circuits for desired applications based on their frequency response characteristics.

CO5. Design experiments for determining the physiognomies of the semiconductor devices like the energy band gap, breakdown voltage and coefficient of resistance.

CO/PO MAPPING:

Course Title:	Applied Physics Lab (Common to ECE, CSE & IT Branches)													
Course Code:	A2PYI102													
Course Designed by	Dept. of Physics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3						1	2	1		1		
CO2	3	3						1	2	1		1		
CO3	3	3						1	2	1		1		
CO4	3	3						1	2	1		1		
CO5	3	3						1	2	1		1		

Course designed by	DEPARTMENT OF PHYSICS
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CIT201	SEMESTER – I	L	T	P	C
	PROGRAMMING FOR PROBLEM SOLVING	3	0	0	3
	Total Contact Hours : 54				
	Prerequisites: Mathematics				

COURSE OBJECTIVES

COBJ1.	Students will study systematic approach to problem solution specification using finite number of unambiguous steps.
COBJ2.	Students will gain understanding of procedural language features using C as the template.
COBJ3.	Students will read and analyse alternative construct choices in procedural language C.
COBJ4.	Students will get exposure to systematic approach of automated solution design, implementation and testing using a procedural language.

SYLLABUS

UNIT – I: [9 HOURS]

INTRODUCTION: Introduction to Programming, Computer System, Hardware and Software concepts.

PROBLEM SOLVING: Algorithm, Pseudo-code, flow-chart, program development steps, high-level, Assembly and machine languages.

BASICS OF C PROGRAMMING: Structure of C program, identifier, basic data types and sizes, constants, variables, arithmetic operators, relational operators, logical operators, increment and decrement operators, assignment operator, conditional operator, scanf and printf built-in functions, Creating and running programs.

UNIT – II: [9 HOURS]

BIT-WISE OPERATORS: logical, shift, rotation, masks.

EXPRESSIONS: expressions, type conversions, conditional expressions, precedence and order of evaluation.

SELECTION: Two-way selection: if-else, nested if, examples, multi-way selection: switch, else-if, examples.

ITERATIVE: loops - while, do-while and for statements, break continue, event and counter controlled loops.

UNIT – III: [18 HOURS]

Part – I: [9 HOURS]

ARRAYS: Arrays (1-D, 2-D), Character arrays and Strings, Searching (Linear Search and Binary Search).

Part – II: [9 HOURS]

BASIC ALGORITHMS: Basic Sorting Algorithms (Bubble, Insertion and Selection), comparing algorithms for complexity.

FUNCTIONS: Functions, Scope and Extent of Variables, Function Parameters, parameter passing using call-by-value, sub-routines, Storage Classes,#define,#ifdef, #ifndef pre-processor directives.

UNIT – IV: [9 HOURS]

RECURSION: Definition of Recursion, example programs using recursion like finding Factorial, Fibonacci series, Quick sort, puzzle solving using recursive functions (towers of hanoi, ackerman function).

POINTERS: Definition of Pointers, Pointer Type, Pointer Arithmetic, Function parameter passing using call-by-reference.

MEMORY ALLOCATION: Difference between static and dynamic memory allocation, dynamic memory allocation using built-in functions, dangling pointer, unreferenced memory problem.

UNIT – V: [9 HOURS]

ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, bit-fields, concept of linked list, program applications.

FILE-HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, command line arguments.

Suggested Text Books

1. Programming For Problem Solving, Behrouz A.Forouzan & Richard F.Gilberg, Cengage Publishers, 3rd Edition
2. Programming In C:A Practical Approach, Ajay Mittal, Pearson Education

Suggested Reference Books

1. Brian W. Kernighan And Dennis M. Ritchie, The C Programming Language, Prentice Hall Of India
2. Introduction To C Programming, Reema Thareja, Oxford University Press
3. E. Balaguruswamy, Programming In Ansi C, Tata Mcgraw-Hill

COURSE OUTCOMES

The student will

1. Have the ability to **describe** a formal algorithmic solution for the given problem, **list** the features of C including scalar & vector data types, operators, **Outline** expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.

2. Have the ability to **describe** one and two-dimensional arrays, **outline** loops and arrays for searching and **describe** various sorting techniques.

3. Have the ability to **outline** the purpose of functions, pointers, command line arguments, dynamic memory allocation. **Define** storage classes. **Describe** command like arguments, structures, unions, and enumeration. Have knowledge of handling files.

4. Have the ability to **solve** complex expressions, **design** algorithms and **develop** programs in C language using the basic constructs, data types, operators, control & iterative statements, and arrays.

5. Have the ability to **apply** arrays to solve complex matrix related problems and strings. **Compare and contrast** various searching and sorting techniques for complexity.
6. Have the ability to **distinguish between** function call types. **Draw inferences on** command line arguments, storage classes, and pre-processor directives. **Use** pointers with functions, arrays, strings, to **solve** complex problems. **Give example** and **solve** classical recursion problems**. Compare and contrast** static and dynamic memory allocation, and **apply** them. **Use** structures and unions to implement and **solve** real-time problems. **Apply** file related functions to process files.

7. Have the ability to **Fully appreciate** the art of procedural programming in C and develop programs **optimally** using the full feature set of C language.

Course Title:	Programming for problem solving (Common to ALL Branches)														
Course Code:	A2CIT201														
Course Designed by	Dept. of Computer Science and Engineering														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSOM	PSON	PSOO
CO1	3	3						3	2	1		2	1	1	1
CO2	3	3						3	2	1		2	1	1	1
CO3	3	3						3	2	1		2	1	1	1
CO4	3	3	3	3	3	3	3	3	2	1	1	2	3	3	3
CO5	3	3	3	3	3	3	3	3	2	1	1	2	3	3	3
CO6	3	3	3	3	3	3	3	3	3	1	1	2	3	3	3
CO7	3	3	3	3	3	3	3	3	3	1	1	3	3	3	3

Levels of Correlation: High-3, Medium-2, Low-1

PROGRAMMING FOR PROBLEM SOLVING PRACTICE

COURSE OBJECTIVES	
1.	To use basic data types, operators, expressions and expression evaluation mechanisms using C Programming Language.
2.	To implement control flows construct in C Programming Language and understand the syntax, semantics and usability contexts of these different construct.
3.	To develop composite data types in C and constructs available to develop their data-types, utilize them to model things and dealing with data from and to external files.
4.	To design programs with different variations of the constructs available for practicing modular programming and understand the pros and cons of using different variants and apply optimization.

UNIT – I

WEEK 1:

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using computers
Lab1: Familiarization with programming environment

i) Exposure to Turbo C, gcc, Code Blocks IDE
ii) Writing simple programs using printf(), scanf()

WEEK 2:

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments/Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts
Lab1: Converting algorithms/flowcharts into C Source code

Developing the algorithms/flowcharts for the following sample programs

i. Sum and average of 3 numbers
ii. Conversion of Fahrenheit to Celsius and vice versa
iii. Simple interest calculation

WEEK 3:

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:
Lab 3: Simple computational problems using arithmetic expressions

i) Finding the square root of a given number
ii) Finding compound interest
iii) Area of a triangle using heron's formulae
iv) Distance travelled by an object

UNIT – II

WEEK 4:

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and their precedence and associativity:
Lab 4: Simple computational problems using the operator's precedence and associativity

i) Evaluate the following expressions
   a. A+B*C+(D*E)+F*G
   b. A/B*C-B+A*D/3
ii) a. A+++B---A
   b. J=(i++)+(++i)
iii) Find the maximum of three numbers using conditional operator
iv) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5:

Objective: Explore the full scope of different variants of "if construct" namely if-else, null-else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures

i) Write a C program to find the max and min of four numbers using if-else
ii) Write a C program to generate electricity bill
iii) Find the roots of the quadratic equation
iv) Write a C program to simulate a calculator using switch case
v) Write a C program to find the given year is a leap year or not

WEEK 6:

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops:
Lab 6: Iterative problems e.g., the sum of series

i) Find the factorial of given number using any loop
ii) Find the given number is a prime or not
iii) Compute sine and cos series
iv) Checking a number palindrome
v) Construct a pyramid of numbers

UNIT – III

WEEK 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1D Arrays: searching
Lab 7: 1D Array manipulation, linear search

i) Find the min and max of a 1-D integer array
ii) Perform linear search on1D array
iii) The reverse of a 1D integer array
iv) Find 2's complement of the given binary number
v) Eliminate duplicate elements in an array

WEEK 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2D arrays, Sorting and Strings
Lab 8: Matrix problems, String operations, Bubble sort

i) Addition of two matrices
ii) Multiplication two matrices
iii) Sort array elements using bubble sort
iv) Concatenate two strings without built-in functions
v) Reverse a string using built-in and without built-in string functions

UNIT-IV

WEEK 9:

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 9: Functions, call by value, scope and extent,
Lab 9: Simple functions using call by value, Solving differential equations using Eulers theorem

i) Write a C function to calculate NCR value
ii) Write a C function to find the length of a string
iii) Write a C function to transpose of a matrix
iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 10:

Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 10: Recursion, the structure of recursive calls

Lab 10: Recursive functions

i) Write a recursive function to generate Fibonacci series
ii) Write a recursive function to find the lcm of two numbers
iii) Write a recursive function to find the factorial of a number
iv) Write a C Program to implement Ackermann function using recursion
v) Write a recursive function to find the sum of series.

WEEK 11:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 11: Call by reference, dangling pointers
Lab 11: Simple functions using Call by reference, Dangling pointers

i) Write a C program to swap two numbers using call by reference
ii) Demonstrate Dangling pointer problem using a C program
iii) Write a C program to copy one string into another using pointer
iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

UNIT – V

WEEK 12:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc(), calloc(), realloc() and free() functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 12: Pointers, structures and dynamic memory allocation
Lab 12: Pointers and structures, memory dereference

i) Write a C program to find the sum of a 1D array using malloc()
ii) Write a C program to find the total, average of n students using structures
iii) Enter n students data using calloc() and display failed students list
iv) Read student name and marks from the command line and display the student details along with the total.
v) Write a C program to implement realloc()

WEEK 13:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly-linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 12: Bitfields**,** Self-Referential Structures, Linked lists
Lab 12: Bitfields, linked lists

i) Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit-fields
ii) Create and display a singly linked list using self-referential structure
iii) Demonstrate the differences between structures and unions using a C program
iv) Write a C program to shift/rotate using bitfields
v) Write a C program to copy one structure variable to another structure of the same type.

WEEK 14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling:
Lab 14: File operations

i) Write a C program to write and read text into a file
ii) Write a C program to write and read text into a binary file using fread() and fwrite()
iii) Copy the contents of one file to another file
iv) Write a C program to merge two files into the third file using command-line arguments
v) Find no. of lines, words and characters in a file
vi) Write a C program to print last n characters of a given file.

TEXTBOOKS:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

REFERENCES:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India
2. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

COURSE OUTCOMES

CO1.	**Demonstrate** the ability to write a formal algorithmic solution for the given problem, **name & explain** the features of C like types including scalar & vector types, operators, expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.
CO2.	**Implement** one and two-dimensional arrays to solve simple mathematical and matrix related problems. **Make use of** loops and arrays for searching and **Compare** various sorting techniques.
CO3.	**Identify** the purpose of functions, pointers, command line arguments, dynamic memory allocation. **Define** storage classes. **Understand** command like arguments, structures and unions. Have **knowledge** of handling files.
CO4.	**Design** algorithms and **develop** programs in C language using the basic constructs, data types, operators, control statements, and arrays.
CO5	**Apply** pointers, functions, derived data types, and dynamic memory allocation, **design** solutions to challenging problems.
CO6	**Illustrate** the art of procedural programming in C and **develop** programs optimally using the full feature set of C language.

Course Title:	Programming for problem solving lab (Common to ALL Branches)														
Course Code:	A2CII201														
Course Designed by	Dept. of CSE & IT														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2	3	1	1	1	2	2			2	2	2
CO2	3	3	1	2	3	1	1	1	2	2			2	2	2
CO3	3	3	2	3	3	2	1	1	2	2			3	3	3
CO4	3	3	2	3	3	3	1	1	2	2			3	3	3
CO5	3	3	3	3	3	3	1	1	2	2			3	3	3
CO6	3	3	3	3	3	3	1	1	3	3	3		3	3	3

Levels of Correlation: High-3, Medium-2, Low-1

Course designed by	DEPARTMENTS OF CSE & IT
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019

A2MED201	SEMESTER - I	L	T	P	C
	COMPUTER AIDED ENGINEERING GRAPHICS	1	-	3	3
	Total Contact Hours – 60				

SYLLABUS

UNIT-I

Overview of Computer Graphics:

Computer technologies that impact on graphical communication, Demonstrating knowledge of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line, The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.

Set up of the drawing page and the printer, Scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing.

Applying dimensions to objects, applying annotations to drawings;

UNIT-II

Layers: Setting up and use of Layers, layers to create drawings, create, edit and use customized layers, concept of view ports.

Introduction to Orthographic Projections: Projections of Points; Projections of Straight Lines parallel to both planes; Projections of Straight Lines-Parallel to one and inclined to other plane.

UNIT-III

Projections of Straight Lines and Planes: Lines inclined to both planes, determination of true lengths, angle of inclinations and traces, Projections of Planes

UNIT-IV

Projections and sections of solids: Projections of simple solids- Sections of solids

UNIT -V

Development of surfaces, Isometric Projection and Conversion of Isometric Views to Orthographic Views: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa

TEXT BOOKS

1. DM Kulkarni, AP Rastogi, AK Sarkar "Engineering graphics with Auto CAD" PHI Publishers
2. Bhatt N.D., Panchal V.M. & Ingle P.R "Engineering Drawing" Charotar Publishing House.

REFERENCE BOOKS

1. Shah, M.B. & Rana B.C "Engineering Drawing and Computer Graphics", Pearson Education.
2. Agrawal B. & Agrawal C. M "Engineering Graphics", TMH Publication.
3. Narayana, K.L. & P Kannaiah "Engineering Drawing", SciTech Publishers.
4. CAD Software Theory and User Manuals.

COURSE OUTCOMES

At the end of the course the students will be able to:

CO1: Prepare two dimensional drawings using draw and modify commands in Auto CAD software and represent dimensions to the drawings

CO2: Clearly differentiate different types of projections and get solutions to projections of points in Auto CAD by applying the layers concept

CO3: Solve problems related to projections of straight lines and planes

CO4: Prepare simple solids in CAD software and obtain solutions to projections and sections of solids

CO5: Develop the surfaces of simple solids, prepare Isometric drawings and convert isometric drawings into orthographic views

CO/PO Mapping

Course Title:	Computer Aided Engineering Graphics													
Course Code:	A2MED201													
Course Designed by	Dept. of Mechanical Engineering													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2		3	1		1	2	3	2	2	3	2
CO2	3	2	2		3	1		1	2	3			2	1
CO3	3	2	2		3	1		1	2	3			2	1
CO4	3	2	3		3	1		1	2	3	2	2	3	1
CO5	3	2	3		3	1		1	2	3	2	2	3	1

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

* * *

A2EHA701	SEMESTER - I	L	T	P	C
	CONSTITUTION OF INDIA	2	-	-	0
	Total Contact Hours – 30				

SYLLABUS

UNIT – I: HISTORY OF MAKING OF THE INDIAN CONSTITUTION

History - Drafting Committee, (Composition & Working)

UNIT – II: PHILOSOPHY OF THE INDIAN CONSTITUTION: Preamble - Salient Features

UNIT-III: CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES: Fundamental Rights -Right to Equality -Right to Freedom -Right against Exploitation -Right to Freedom of Religion -Cultural and Educational Rights -Right to Constitutional Remedies ; Directive Principles of State Policy ; Fundamental Duties.

UNIT-IV: ORGANS OF GOVERNANCE: Parliament -Composition - Qualifications and Disqualifications - Powers and Functions - Executive - President - Governor - Council of Ministers; Judiciary, Appointment and Transfer of Judges, Qualifications.

UNIT – V: LOCAL ADMINISTRATION: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayati raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat : Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

TEXT BOOK:
Reference Source compilation

REFERENCES:
1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.

COURSE OUTCOMES:

CO1. Students will be able to discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.

CO2. Students will be able discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.

CO3. Students will be able to discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP]under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.

CO4. Students will be able to discuss the passage of the Hindu Code Bill of 1956.

CO5. Students will be able to discuss the powers of Executive, Judiciary and Legislature.

CO/PO Mapping

Course Title:	Constitution of India (Common to ALL Branches)
Course Code:	A2EHA701
Course Designed by	Dept. of English & Humanities

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2								
CO2						2								
CO3						2								
CO4						2								
CO5						2								

Course designed by	DEPARTMENT OF ENGLISH & HUMANITIES
Approval	Approved by: Meeting of Board of Studies held on 23.06.15
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

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A2MAT103	SEMESTER - II	L	T	P	C
	MATHEMATICS-II (CSE & IT)	3	0	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: RANDOM VARIABLES & PROBABILITY DISTRIBUTIONS

Random Variables: Discrete and continuous random variables, properties of mass and density functions. Mathematical Expectation: Properties (statements), Moment Generating Function; Outlines: of Binomial and Poission distributions; Normal Distribution: Probability density function, Normal approximation to Binomial Distribution, Parameters of Normal Distribution(statements), Characteristics of normal distribution, Area under normal curve, Standard normal distribution.

UNIT- II: STATISTICAL METHODS

Curve fitting by least squares method: Bi-variate data, scatter diagram, method of least squares, normal equations, fitting of straight line, second degree curve (parabola), exponential and power curves; Correlation: types of correlation, measures of correlation, Karl Pearson coefficient of correlation and its properties; Regression Analysis: Regression Coefficients and its Properties, Regression lines.

UNIT-III: SAMPLING DISTRIBUTIONS AND TESTING OF HYPOTHESIS (LARGE SAMPLES)

Sampling distributions: population, sample, population parameters, sample statistic and types of sampling, sampling distribution of means (with and without replacement), standard error, Testing of hypothesis (large samples): Statistical hypothesis, null hypothesis, alternative hypothesis, type-I and type-II errors, critical region, level of significance, one tailed and two tailed tests.

Large Sample tests: Z-test for single mean and difference of means, single proportion and difference of proportions.

UNIT-IV: TESTING OF HYPOTHESIS (SMALL SAMPLES)

Testing of hypothesis (small samples): Introduction to small sample tests, degrees of freedom, Student's t, F and Chi-square distributions; student's t-test: t-test for single mean, difference of means and paired t-test; Chi-square test: Goodness of fit, independence of attributes, F-test: equality of population variances.

UNIT-V: QUEUING THEORY

Introduction to Queuing Models: Introduction to stochastic process, states space, Markovian's property, Input pattern, service pattern, queue discipline, Queue behavior, Kendal's notation, Pure Birth and Death Models, Traffic intensity; (M/M/1: ∞/FIFO)-Model: Average System length, Average queue length , Average waiting time and related probabilities; (M/M/: N/FIFO)-Model: Average system length, average queue length, average waiting time and related probabilities.

//Topics prefixed with 'outlines / overview' are not for assessment//

TEXT BOOKS:

1. RE Walpole, SL Mayeres & K May, Probability and Statistics for Engineers & Scientists, 3/e, Pearson Publishers
2. T.K.V. Iyengar et al, Probability and Statistics, S. Chand Publications, Revised edition.

REFERENCE BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017
2. Murugesan and Gurusamy, Probability, Statistics and Random Process, Anuradha Publicatons.
3. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

COURSE OUTCOMES:

At the end of course, students shall be able to:

CO 1 Recall the concepts of random variables, probability distributions and statistical methods.

CO 2 Recall the concepts of Sampling distributions and testing of hypothesis (large samples).

CO 3 Recall the concepts of testing of hypothesis (small samples), stochastic processes and queuing models.

CO 4 Understand and interpret the concepts of random variables, probability distributions and statistical methods.

CO 5 Understand and interpret the concepts of Sampling distributions and testing of hypothesis (large samples).

CO 6 Understand and interpret the concepts of testing of hypothesis (small samples), stochastic processes and queuing models.

CO 7 Apply the tools of probability and statistics to real world problems.

CO/PO Mapping

Course Title:	MATHEMATICS-II (CSE & IT)													
Course Code:	A2MAT103													
Course Designed by	Dept. of Mathematics													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2							2			
CO2	3	3		2							2			
CO3	3	3		2							2			
CO4	3	3		2							2			
CO5	3	3		2							2			
CO6	3	3		2							2			
CO7	3	3		2							2			

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 06.07.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CYI101	SEMESTER - II	L	T	P	C
	ENGINEERING CHEMISTRY (COMMON TO ECE, CSE, CHE & IT)	3	--	2	5
	Total Contact Hours – 48				

SYLLABUS

UNIT 1: WATER TECHNOLOGY

Introduction –Soft Water and hardness of water, Estimation of hardness by EDTA Method - Boiler troubles - Industrial water treatment – specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, zeolite and ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.

UNIT 2: POLYMERS

Introduction to polymers, functionality of monomers, addition and condensation polymerization, copolymerization, stereospecific polymerization with specific examples. Thermoplastics and Thermo-sets – their differences.

Elastomers – applications with specific examples- Preparation, properties and uses of PVC, Bakelite, Teflon and Nylon-6, 6, Buna-S and Thiokol rubber- Fibre reinforced plastics – carbon fibre, glass fibre and aramids.

UNIT 3: ELECTROCHEMISTRY AND APPLICATIONS

Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations.
Primary cells –dry cell- Secondary cells – lead acid, nickel-cadmium and lithium ion batteries- working of the batteries including cell reactions- Fuel cells, hydrogen-oxygen, and methanol fuel cells – working of the cells.
Corrosion: Introduction to corrosion, mechanism of dry and wet corrosion, Pilling Bedworth ratios and uses, Types of corrosion – Differential aeration corrosion, galvanic corrosion, pitting corrosion, waterline corrosion and stress corrosion, Factors affecting the rate of corrosion – metal based factors and environmental based factors, protection techniques – metal coatings – galvanization and tinning, cathodic protection, inhibitors – cathodic and anodic, organic coatings – paints – constituents and their functions.

UNIT-4: CHEMISTRY OF ADVANCED MATERIALS

NANOMATERIALS: introduction- synthesis of Nano material by sol gel method- CVD- engineering applications of Nano materials

CEMENT: Introduction to ordinary Portland cement- manufacturing of OPC- setting and hardening of cement- decay of cement.

FUELS: Introduction- classification- liquid fuels- cracking- knocking- octane number and cetane number; Lubricants- definition- mechanism and properties of lubricants

UNIT 5: INSTRUMENTAL METHODS AND APPLICATIONS

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle, instrumentation (Block diagram and working), applications of UV, IR and NMR

spectroscopic methods. Chromatography- introduction- Ion exchange chromatography- applications

COURSE OUTCOMES:

CO1: The student will have the ability to describe softening methods and desalination processes. He/ She will be able to explain various types of polymers; preparation, properties and engineering applications of thermoplastic, thermosetting plastics, rubbers and FRP's.

CO2: The student will have the ability to describe electrochemical reactions, principles of batteries, fuel cell and corrosion.

CO3: The student will have the ability to outline electromagnetic spectrum and explain the working principles of IR, UV, NMR and chromatographic techniques. The student describes the synthesis, properties and applications of nanomaterials, cement. HE/ She Outlines the cracking methods, knocking of fuels.

CO4: The student will have the ability to differentiate between hard and soft water, demineralization and deionization processes and thermosetting – thermoplastic materials.

CO5: The students will have the ability to give examples on primary and secondary batteries, various types of corrosion, methods of corrosion prevention.

CO6: The student will have the ability to draw inferences on the principles and applications of various instrumental methods and also can compare and contrast between cracking methods.

CO7: The student will have the ability to analyze water samples and validate the results obtained and apply their knowledge on polymers, batteries, materials and instrumentation.

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

Reference books:

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. H.Kaur, Instrumental Methods of chemical analysis, Pragathi Prakashan, 2012.
3. Chemistry for Engineers, Teh Fu Yen, Imperial college press, London

CO/PO Mapping

Course Title:	Engineering Chemistry													
Course Code:	A2CYI101													
Course Designed by	Dept. of Chemistry													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								2			1		
CO2	3								2			1		
CO3	3								2			1		
CO4	3								2			1		
CO5	3								2			1		
CO6	3								2			1		
CO7	3								2			1		

Course designed by	DEPARTMENT OF CHEMISTRY
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

Engineering Chemistry - Laboratory

List of Experiments:

1. Determination of HCl using sodium carbonate
2. Determination of Hardness of a groundwater sample.
3. pH metric titration of strong acid vs. strong base
4. Condcutometric titration of Strong acid VS Strong base
5. Condcutometric titration of Weak acid VS strong base
6. Potentiometric titration of Fe(II) with potassium dichromate
7. Determination of Strength of an acid in Pb-Acid battery
8. Preparation of a polymer
9. Determination of viscosity of polymer solution using survismeter
10. Determination of percentage of Iron in Cement sample by colorimetry
11. Estimation of Calcium oxide in port land Cement
12. Preparation of Nanomaterials (ex: Fe/ Zn/ Ferrite)
13. Adsorption of acetic acid by charcoal
14. Determination of acid value and saponification value of a given lubricant
15. Project based learning (Mandatory for all students)

Course Outcomes:

CO1: The student will be able to determine total hardness, strength of acid in a lead acid battery, calcium in Portland cement using volumetric analysis

CO2: The student will be able to explain condcutometric, potentiometric, pH metric titrations and colorimetric determination.

CO3: The student will be able to explain the synthesis of a polymer, nanomaterials

CO/PO Mapping

Course Title:	Engineering Chemistry													
Course Code:	A2CYI101													
Course Designed by	Dept. of Chemistry													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		1			1				1	1	2		
CO2	3		1			1				1	1	1		
CO3	3		1							1	1	1		

Course designed by	DEPARTMENT OF CHEMISTRY
Approval	Approved by: Meeting of Board of Studies held on 29.06.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2EEI201	SEMESTER – II	L	T	P	C
	Basic Electrical Engineering (COMMON TO ECE, CSE, CHE & IT)	3	1	2	5
	Total Contact Hours – 50				

SYLLABUS

UNIT 1: D.C. CIRCUITS

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, Analysis of simple circuits with DC excitation, Superposition, Thevenin's and Norton's Theorems, Time-domain analysis of first-order RL and RC circuits.

UNIT 2: A.C. CIRCUITS

Representation of sinusoidal waveforms, Average and RMS values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase AC circuits (Series & Parallel), Resonance, Three-phase balanced circuits, voltage and current relations in star and delta configurations.

UNIT 3: DC & AC MACHINES [ELEMENTARY TREATMENT ONLY]

Principle and operation of DC Generator - EMF equation – open circuit characteristic of DC shunt generator – principle and operation of DC Motor – Types of DC Motors – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of single-phase Transformer - OC and SC tests on transformer - principle and operation of single phase & Three phase Induction Motors, construction and working of synchronous motors

UNIT 4: BASICS OF POWER SYSTEMS:

Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.

UNIT 5: ELECTRICAL INSTALLATIONS

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Types of Batteries, Characteristics of Batteries. Elementary calculations for energy consumption, power factor improvement, battery backup.

TEXT BOOK/ REFERENCES:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010
2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
3. Vincent Del Toro, "Electrical Engineering Fundamentals", Pearson, 2015.

COURSE OUTCOMES:

At the end of the course, Student will be able to

CO1. To recall fundamental concepts of electrical circuits such as charge, voltage, current and power.
CO2. Describe the principle of operation of D.C. & A.C. machines.
CO3. Outline the working operation of various generating stations.
CO4. Explain the procedure for solving circuits with A.C and D.C. Excitation
CO5. Summarize the performance characteristics of different machines.
CO6. Explain about different equipment used in power industry
CO7. Apply the fundamental laws, associated with Basic Electrical Engineering to solve real world problems in the field of Engineering

CO/PO Mapping

CO / PO mapping	Program Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
To recall fundamental concepts of electrical circuits such as charge, voltage, current and power.	3	3	1	1			3			1			1	1
Describe the principle of operation of D.C. & A.C. machines.	3	2	2	2	2					1			1	1
Outline the working operation of various generating stations.	3	3	3	1	1		1			1			1	1
Explain the procedure for solving circuits with A.C and D.C. Excitation	3	3	2	1	1		2			1			1	1
Summarize the performance characteristics of different machines.	3	3	2	1	1	3	1			1			1	1
Explain about different equipment used in power industry	3	3	2	1		2	2			1		1	3	2
Apply the fundamental laws, associated with Basic Electrical Engineering to solve real world problems in the field of Engineering	3	3	3	3	3	2	2			2		3	3	3

Course designed by	Department of Electrical & Electronics Engineering
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

Basic Electrical Engineering Laboratory

LIST OF EXPERIMENTS

Basic safety precautions, Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope, resistors, capacitors and inductors.

1. Verification of Kirchhoff laws.
2. Verification of Network Theorems.
3. Magnetization characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. Predetermination of performance parameters of 1 – Phase Transformer.
6. I – V Characteristics of Solar PV cell
7. Brake test on DC Shunt Motor.
8. Measurement of earth resistance.
9. Measurement of reactive power in three phase balanced circuit.
10. Measurement of Choke coil parameters
11. Brake test on 3 - Phase Induction Motor.
12. Determination of AC quantities using CRO/DSO.
13. I – V characteristics of battery.

COURSE OUTCOMES:

At the end of the course, Student will be able to

CO 1. Identify common electrical equipment used in laboratory.(L1)

CO 2. Estimate the ratings of different equipment used to perform an experiment. (L2)

CO 3. Demonstrate the usage of various electrical measuring instruments.(L3)

CO 4. Analyze the characteristics of rotating & stationery electrical machines (L4).

CO 5. Interpret the characteristics of PV cell and Battery.(L5)

CO/PO Mapping

CO / PO Mapping	Program Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
Identify common electrical equipment used in laboratory.	3		1	1	3	1			3	2	2	2	2	1
Estimate the ratings of different equipment used to perform an experiment.	3	2	3	3	3	2	1		3	3	2	2	2	3
Demonstrate the usage of various electrical measuring instruments.	2	2	2	2	3	1			3	3	1	2	2	1
Analyze the characteristics of rotating & stationery electrical machines.	3	3	3	3	2				3	3		2	3	2
Interpret the characteristics of PV cell and Battery.	3	3	3	3	3		1		3	3	2	2	3	3

Course designed by	Department of Electrical & Electronics Engineering
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2EHL001	SEMESTER - II	L	T	P	C
	Essential Communication in English	1	-	3	3
	Total Contact Hours – 60				

SYLLABUS

UNIT – I: BASIC LANGUAGE SKILLS – A REFRESHER

Organs of Speech: Consonant Sounds &Vowel Sounds; Phonemic Transcription; Using a Dictionary to know the Pronunciation of a word

Presenting Oneself: Introducing oneself -Using different expressions in Formal&Informal Contexts.

Reading a News Article: Identifying the key words and their usage; summarizing the information

Word Study & Mind Mapping: Root words–Derivatives; Homonyms, Homographs, Homophones; Synonyms & Antonyms

UNIT – II: RUDIMENTS OF FUNDAMENTAL COMMUNICATION

The World: Listening & watching Documentaries on World famous Places.

Describing People, Places and Life experiences: Physical Description- Describing someone's qualities – Usage of Jargon to present topography.

Short Story Corner: Reading a short story – Understanding the mood and essence – Sharing different perspectives.

Sentence Patterns: Concord – Rules – Common errors in day-day usage

UNIT-III: COMMUNICATION AT PRACTICE

Oratory Skills: Listening to World's Famous Speeches

JAM (Just a Minute) Talk: Format & Delivery Techniques

Nuances of Language: Company Description –Position Description (Formal) – processes like Chocolate Making(Informal)**.**

Types of Sentences – Declarative, Interrogative, Assertive etc.

UNIT-IV: COMMUNICATION THROUGH CONCEPTUAL LEARNING

BBC English: Watching interviews of Famous people.

Dialogue Practice: Situational Dialogues; Structuring a Role Play

New Inventions: Reading about latest technology pertaining to different fields (Source : Science Journals)

Transformation of sentences: Active Voice-Passive Voice**,** Direct & Indirect Speech**,** Degrees of Comparison**,** Simple Compound & Complex Sentences.

UNIT – V: COMMUNICATION THROUGH LIFE SKILLS

Watching Movies for Language Enrichment & Writing Reviews.

Skits: Enacting a Skit on a Social Issue

Reflections: Reading News Paper Editorial columns, Literacy Reviews, Poetry

Presenting an autobiography: Exploring different styles of writing autobiographies and evolving an own style**.**

TEXT BOOK:
Reference Source Compilation by the Department

REFERENCES:
1. **Fundamentals of Technical Communication** by Meenakshi Raman,OUP.
2. **Living English Structure** by W.Stannard Allen, Pearson Publications.
3. **English Made Easy** by Mary Margaret Hosler, Mc Graw Hill.
4.. **English and Communication Skills for Students of Science and Engineering**, by Dhanavel, S.P. Orient Blackswan Ltd.
5. **The Oxford Guide to Writing and Speaking** by John Seely , OUP

COURSE OUTCOMES:

CO1. Student will be able to come to terms with the basic language Skills required to cater to the requirement of the programme undertaken.

CO2. Student will be able to comprehend and analyze the core concepts well.

CO3. Student will be able to gain proficiency in all four skills of Language – Listening, Reading, Speaking and Writing.

CO4. Student will be able to understand the Syntactical and Grammatical Components of English Language and their correct use.

CO5: Student will be able to present his/her ideas confidently in a Professional manner.

CO/PO Mapping

Course Title:				**Essential Communication in English**										
Course Code:				A2EHL001										
Course Designed by				Dept. of English & Humanities										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2		2	3	3		3		
CO2						2		2	3	3		3		
CO3						2		2	3	3		3		
CO4						2		2	3	3		3		
CO5						2		2	3	3		3		

Course designed by	DEPARTMENT OF ENGLISH & HUMANITIES
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2CIW201	SEMESTER - II	L	T	P	C
	BASIC IT TOOLS WORKSHOP	0	0	3	2
	Total Contact Hours – 56 Hours (14 Weeks)				
COURSE OBJECTIVES					
COBJ1.	To Introduce the internal parts of a computer, peripherals, I/O ports, connecting cables				
COBJ2.	To Teach basic command line interface commands on Linux				
COBJ3.	To Teach the usage of Internet for productivity and self-paced lifelong learning				
COBJ4.	To Introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spreadsheets and Presentation tools				

UNIT 1: COMPUTER HARDWARE

Types of Computing Devices such as PC, Laptops, Servers, Smart Phones, Tablets, other accessories, PC parts, Input/Output devices, I/O ports and interfaces, main memory, cache memory and secondary storage technologies, digital storage basics, networking components and speeds.

Unit Outcomes:

Student should be able to

1. Identify various kinds Computing devices and their components.
2. Identify the different peripherals, ports and connecting cables in a PC.
3. Assemble and disassemble components of a PC

References:

1. Introduction to computer-peter Norton
2. https://explorersposts.grc.nasa.gov/post631/2006-2007/computer_basics/ComputerPorts.doc
3. https://explorersposts.grc.nasa.gov/post631/2006-2007/bitsnbyte/Digital_Storage_Basics.doc

UNIT 2: OPERATING SYSTEMS

Virtual Machine setup:

- Setting up and configuring a new Virtual Machine
- Setting up and configuring an existing Virtual Machine
- Exporting and packaging an existing Virtual Machine into a portable format

Operating System installation:

- Installing an Operating System such as Linux on Computer hardware.

Linux Operating System commands:

- General command syntax
- Basic *help* commands: whatis, man, info
- Filesystem: ls, mkdir, cd, touch, chmod, rm, mv, bc, finger, who, whoami, ps, du, df
- Date and Time: cal, date,
- Filters and Text processing: echo, cat, tac, rev, more, less, head, tail, nl, cut, paste, wc, sort, uniq, cp, cmp, diff, tr, ln, grep, fgrep, egrep, sed, awk, find, xargs, tee,
- File compression: tar, compress, uncompress, split, uuencode, uudecode, gzip, gunzip, read, expr, test, ping, ssh
- Miscellaneous: apt-get, vi editor

- Shell I/O redirection and piping, regular expressions, simple shell programs without control structures.
- Search for "20 examples of grep in linux" and practice like this on all the given commands.

https://www.thegeekstuff.com/2009/07/linux-ls-command-examples
https://www.pcsuggest.com/basic-linux-commands/
https://www.linuxtechi.com/25-find-command-examples-for-linux-beginners/

Unit Outcomes:

Student should be able to:

1. construct a fully functional virtual machine
2. summarize various linux operating system commands

References:

1. https://www.vmware.com/pdf/VMwarePlayerManual10.pdf
2. https://zorinos.com/help/
3. https://zorinos.com/help/install-zorin-os/
4. https://geek-university.com/vmware-player/manually-install-a-guest-operating-system/
5. https://clearlinux.org/documentation/clear-linux/get-started/virtual-machine-install/vmw-player-preconf
6. https://www.thegeekstuff.com/2009/07/linux-ls-command-examples
7. https://www.pcsuggest.com/basic-linux-commands/
8. https://www.linuxtechi.com/25-find-command-examples-for-linux-beginners/

UNIT 3: NETWORKING AND INTERNET

Networking Commands :

- ping, ssh, ifconfig, scp, netstat, ipstat, nslookup, traceroute, telnet, host, ftp, arp, wget,route

Internet Services:

- Web Browser usage and advanced settings like LAN, proxy, content, privacy, security, cookies, extensions/plugins
- Antivirus installation, configuring a firewall, blocking pop-ups
- Google search techniques(text based, voice based)
- alexa website traffic statistics
- Email creation and usage
- google hangout/skype/gotomeeting video conferencing
- archive.org for accessing archived resources on the web
- Creating a Digital Profile on LinkedIn, Twitter, Github

Unit Outcomes:

Students should be able to

1. resolve internet connectivity issues
2. secure a computer from cyber threats
3. apply google search techniques
4. create their own digital profile on social media

References:

1. http://www.googleguide.com/advanced_operators_reference.html
2. https://www.alexa.com/find-similar-sites
3. https://www.alexa.com/topsites examine links Global, By Country and By Category
4. Use https://archive.org/ to locate missing links in other sites.

UNIT 4: PRODUCTIVITY TOOLS

Productivity Tools:

- archival and compression tools
- scanning and image editing tools
- photography with digital camera and photo editing tools
- OCR and text extraction
- audio players, recording using Mic, editing, podcast preparation
- video players, recording using webcam/camcorder, editing
- podcast, screencast, vodcast, webcasting

Unit Outcomes:

Students should be able to:

1. archive and unarchive data on the file system using relevant compression tools
2. edit photos & images in various formats using photo & image editing tools
3. recognize characters & extract text from scanned images
4. create audio files and podcasts
5. create video tutorials and publishing

References:

1. File Archivers: https://en.wikipedia.org/wiki/File_archiver .
   Comparison of file archivers:
   https://en.wikipedia.org/wiki/Comparison_of_file_archivers
2. Image editing: https://en.wikipedia.org/wiki/Image_editing
   Comparison of raster graphics editors:
   https://en.wikipedia.org/wiki/Comparison_of_raster_graphics_editors
3. Optical Character Recognition:
   https://en.wikipedia.org/wiki/Optical_character_recognition
4. Audio editing software: https://en.wikipedia.org/wiki/Audio_editing_software
   Comparison of free software for audio:
   https://en.wikipedia.org/wiki/Comparison_of_free_software_for_audio
5. Video editing software: https://en.wikipedia.org/wiki/Video_editing_software
   Comparison of video editing software:
   https://en.wikipedia.org/wiki/Comparison_of_video_editing_software
6. Podcast: https://en.wikipedia.org/wiki/Podcast, Screencast:
   https://en.wikipedia.org/wiki/Screencast, Webcast:
   https://en.wikipedia.org/wiki/Webcast

UNIT 5: OFFICE TOOLS

Cloud based productivity enhancement and collaboration tools:

- Store, sync, and share files with ease in the cloud
  - Google Drive
- Document creation and editing text documents in your web browser
  - Google docs
- Handle task lists, create project plans, analyze data with charts and filters
  - Google Sheets

- Create pitch decks, project presentations, training modules
    - Google Slides
- Manage event registrations, create quizzes, analyze responses
    - Google Forms
- Build public sites, internal project hubs
    - Google Sites
- Web-based service providing detailed information about geographical regions and sites around the world. Explore the globe by entering addresses and coordinates
    - Google Maps and Earth
- Online collaboration through cross-platform support
    - Jamboard
- Keep track of important events, sharing one's schedule, and create multiple calendars.
    - Google Calendar

Unit Outcomes:
Students should be able to:

1. use office tools for documentation
2. build interactive presentations
3. navigate through the globe
4. build websites
5. create quizzes & analyze responses

References:

1. Cloud computing, productivity and collaboration tools, software and products offered by Google:https://en.wikipedia.org/wiki/G_Suite,
2. G Suite Learning Center: https://gsuite.google.com/learning-center/products/#!/

COURSE OUTCOMES

Students should be able to

1. Identify various computing devices and functional parts of a PC by assembly and disassembly
2. Construct a functional virtual machine and summarize various Linux operating system commands
3. List various networking commands and secure an individual PC or a network from cyber threats
4. Apply Google search techniques, create their own digital profile on social media
5. Edit Multimedia using various tools for image, audio and video processing
6. Use office tools for documentation and building interactive presentations
7. Use social networking for information gathering and online collaboration

CO/PO Mapping

Course Title:				**BASIC IT TOOLS WORKSHOP (CSE&IT)**									
Course Code:				**A2CIW201**									
Course Designed by				Dept. of CSE & IT									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO2
CO1	2				3						3		3
CO2	2	3			3						3		3
CO3			3		2						3		2
CO4						2				3	3		2
CO5	2				2						3		2
CO6							3		2		3		
CO7			2			3	3	3	3	2	3	3	

Course designed by	DEPARTMENTS OF CSE & IT
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019.
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

* * *

M.Tech(Structural Engg)

MAHARAJ VIJAYARAM GAPATHI RAJ COLLEGE OF ENGINEERING(AUTONOMOUS)
Vijayaram Nagar Campus, Chintalavalasa, Vizianagaram-535005, Andhra Pradesh
Accredited by NAAC with 'A' Grade & Listed u/s 2(f) & 12(B) of UGC
(Approved by AICTE, New Delhi and Permanently Affiliated by JNTUK-Kakinada)
NBA Accredited UG Courses: B.Tech(MEC), B.Tech(CIV), B.Tech(EEE), B.Tech(ECE), B.Tech(CSE), B.Tech(IT), B.Tech(MEC) & B.Tech(CHE) and PG Course: MBA

ACADEMIC REGULATIONS & CURRICULUM

M.Tech. (Structural Engineering)

Applicable to the students admitted from the Academic year 2019-2020

MAHARAJ VIJAYARAM GAJAPATHI RAJ COLLEGE OF ENGINEERING

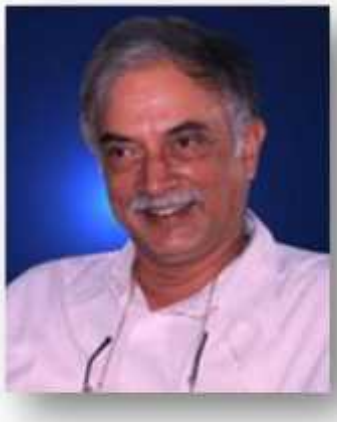
(Autonomous)

(Approved by AICTE, New Delhi, and permanently affiliated to JNTUK, Kakinada)
Re-Accredited by NBA, Re-accredidated by NAAC with 'A' Grade,
Listed u/s 2(f) & 12(B) of UGC Act 1956.
Vijayaram Nagar Campus, Chintalavalasa,
Vizianagaram-535005, Andhra Pradesh

The visionaries

Late Dr. P V G Raju
Raja Saheb of Vizianagaram
Founder Chairman-MANSAS
Ex-Minister for Education and Health, Govt. of AP
Ex Member of Parliament

Late Dr. P. Anand Gajapathi Raju
Ex-Chairman-MANSAS
Ex-Minister for Education and Health
Govt. of AP
Ex Member of Parliament



P. Ashok Gajapathi Raju
Chairman-MANSAS
Ex-Union Minister for Civil Aviation,
Govt. of India
Ex-Minister for Finance, Govt. of AP

Vision

Maharaj Vijayaram Gajapathi Raj College of Engineering strives to become a centre par excellence for technical education where aspiring students can be transformed into skilled and well-rounded professionals with strong understanding of fundamentals, a flair for responsible innovation in engineering practical solutions applying the fundamentals, and confidence and poise to meet the challenges in their chosen professional spheres.

Mission

The management believes imparting quality education in an atmosphere that motivates learning as a social obligation which we owe to the students, their parents/guardians and society at large and hence the effort is to leave no stone unturned in providing the same with all sincerity. Towards that end, the management believes special focus has to be on the following areas:

M1: Have on-board staff with high quality experience and continuously updating themselves with latest research developments and sharing that knowledge with students.

M2: Having a well stream-lined teaching learning process that is continuously assessed for effectiveness and fine-tuned for improvement.

M3: Having state-of-the-art lab and general infrastructure that gives students the necessary tools and means to enhance their knowledge and understanding.

M4: Having a centralized department focused on improving placement opportunities for our students directly on campus and coordinating the training programs for students to Complement the curriculum and enhance their career opportunities.

M5: Having advanced research facilities and more importantly atmosphere to encourage students to pursue self-learning on advanced topics and conduct research.

ABOUT THE INSTITUTION:

Maharajah Alak Narayan Society of Arts and Science (MANSAS) is an Educational Trust founded by Dr. (late) P.V.G Raju, Raja Saheb of Vizianagaram in the hallowed memory of his father Maharajah Alak Narayan Gajapati with a view to confound socio-economic inequalities in the Vizianagaram principality executing a trust deed on 12-11-1958 duly established Maharajah's College and other educational institutions in and around Vizianagaram. The Trust is a charitable one published under Section 6 a (1) of A.P Charitable and Hindu Religious Institutions and Endowment Act 30 of 1987.

The object of the Trust is to manage the properties of educational institutions under it and to promote and advance the cause of education in general, besides awarding scholarships to deserving students enabling them to undergo special training in science and industries in and out of India. The Trust has made an uncompromising contribution to the nation by presenting the stalwarts.

Trust offers KG to PhD level education in Arts, Sciences, Law, Pharmacy, Humanities Education, Engineering and Management and presently houses 13 Educational Institutions. MVGR College of Engineering is one of the 13 Institutes.

Other Institutions under MANSAS

1. M.R. HIGH SCHOOL 1857
2. M.R COLLEGE **(NAAC ACCREDITED)** 1879
3. M.R. COLLEGE OF EDUCATION 1950
4. M.R. WOMENS COLLEGE **(NAAC ACCREDITED)** 1962
5. M.R. GIRLS HIGH SCHOOL 1974
6. M.R. MODEL HIGH SCHOOL 1974
7. M.R. ENGLISH MEDIUM SCHOOL 1979
8. M.R.V.R.G.R LAW COLLEGE 1987
9. M.R. P.G. COLLEGE **(NAAC ACCREDITED)** 1987
10. M.R.SCHOOL OF MANAGEMENT STUDIES 1994
11. M.R.V.R.G.R – II MEMORIAL JR. COLLEGE 1994
12. M.R. COLLEGE OF PHARMACY 2004

Maharaj Vijayaram Gajapathi Raj (MVGR) College of Engineering was established in the year 1997 by Maharaj Alak Narayan Society for Arts and Sciences (MANSAS) to impart quality technical education. The Institution is located in lush green, serene and pollution free environment spread over 60 acres of land in Chintalavalasa village situated in the outskirts of Vizianagaram, a fort city in the north coastal region of Andhra Pradesh.

Institution at a glance:

- MVGR is a 22 years old institution, established in 1997
- All eligible UG Programs (CHEMICAL, CIVIL, CSE, ECE, EEE, IT & MECHANICAL) were re-accredited by NBA.
- MBA program was also re-accredited by NBA.
- Had been re-accredited with Grade ‘A’ by NAAC of UGC
- Has Permanent affiliation with JN Technological University-Kakinada
- Listed under sections 2(f) & 12(b) of UGC act 1956.
- Approved by AICTE-New Delhi
- EIGHT departments are recognized as RESEARCH CENTERS by JNTU-K
- Granted Autonomy by UGC in 2015
- Campus of 60 acre

- Offering 7 UG and 5 M.Tech and MBA program
- About 250 faculty of which 84 Ph.D. Degree holders
- 83 Laboratories with an investment of about 13 crores
- Total built up area of about 7 Lakh sft
- About 42,000 volumes and Access to 8 international online journal packages like IEEE, SPRINGER, etc.
- 1420 Systems & 395 Mbps band width internet facility
- About Rs. 4 crore worth of on-going R&D projects
- Actively involved in civil engineering consultancy work as Third Party Quality Auditor for Vizianagaram Municipality
- WIPRO Recognized technology learning center and MISSION 10X partner institution
- Recognized National Instruments Academy for Training in LabView
- SIRO Recognition by DSIR
- Recognized PTC Centre of Excellence for Creo Training
- Identified by MSME as Business Incubation Centre
- APSSDC-Siemens Technical Skill Development Institute
- Recognized CMs SKILL EXCELLENCY CENTER (SEC)
- Micrsoft Ed-vantage Platinum Partner
- Institutional member of IUCEE
- Institutional Member of CII
- Member, Chamber of Commerce, Vizianagaram
- Green Campus award by Govt. of AP

MVGR College of Engineering is rated as one among the best engineering colleges in the state of Andhra Pradesh as it set up highest standards in all areas of curricular, co-curricular and extra-curricular activities and in students' placements. Based on industry and expert's feedback, the college is updating the curriculum from time to time. The college offers many value added add-on courses students and conducts training programs to meet the industries' requirements.

Academic Regulations for M.Tech. Program

Applicable to the students admitted from the Academic year 2019-20 onwards.

1. PROGRAM STRUCTURE:

M.TECH:

S.No	Category	Credits
1	Program core courses	16
2	Program Elective courses	19
3	Open Electives	3
4	Research Methodology and IPR	2
5	Mini Project with seminar	2
6	Dissertation / Industrial Project	26
7	Audit courses 2	0
	Total	68

Open Elective

1. Business Analytics
2. Composite Materials
3. Cost Management of Engineering Projects
4. Industrial Safety
5. Operations Research
6. Waste to Energy

Audit course 1 & 2

1. Constitution of India
2. Disaster Management
3. English for Research Paper Writing
4. Pedagogy Studies
5. Personality Development through Life Enlightenment Skills.
6. Sanskrit for Technical Knowledge
7. Stress Management by Yoga
8. Value Education

2. PROGRAM PATTERN:

The program is for 2 academic years - 4 semesters.

3. AWARD OF DEGREE:

A student will be declared eligible for the award of degree if he/she fulfills the following academic regulations.

- A student shall be declared eligible for the award of the degree, if he/she pursues a course of study for not less than two academic years and not more than four academic years.

- A student shall register for **68** credits and secure all **68** credits.
- Students who fail to complete Two Years Course of study within Four years shall forfeit their seat and their admission stand cancelled.

4. CERTIFICATION PROGRAMS:

S.No.	Dept	Name of the Program
1	MECH	Windchill 10.2 PDM by Adroitec Engineering Solutions Pvt. Ltd., Hyderabad
2	MECH	Creo 2.0 by PTC
3	MECH	Edgecam by Verosoft, UK
4	MECH	ANSYS Training and Certification by Mechanical Department
5	MECH	AUTOCAD Training and Certification by Mechanical Department
6	MECH	Catia by APSSDC-Dassault Systemes, CM's Center of Excellence
7	MECH	Delmia by APSSDC-Dassault Systemes, CM's Center of Excellence
8	MECH	Simulia by APSSDC-Dassault Systemes, CM's Center of Excellence
9	MECH	2-Wheeler Automobile Certification by APSSDC-SIEMENS
10	MECH	4-Wheeler Automobile Certification by APSSDC-SIEMENS
11	MECH	Welding Certification by APSSDC-SIEMENS
12	MECH	CNC Certification by APSSDC-SIEMENS
13	MECH	Commercial Electrical Certification by APSSDC-SIEMENS
14	MECH	Solid Edge Certification by APSSDC-SIEMENS
15	CHEM	Chemical Process Design and Simulation by Simtech Simulations, Hyderabad
16	ECE	Embedded Systems by ThinkLABS, Mumbai
17	ECE	Labview by National Instruments Systems India Pvt. Ltd.
18	ECE	Unified Technology Learning Program (UTLP) by Wipro Mission 10X
19	CSE, IT	PEGA by Virtusa Corporation
20	CSE, IT	Microsoft technologies by Microsoft Corp.
21	CSE, IT	Ethical Hacking by EC-Council Academia
22	CSE, IT	Java and C by Talent Sprint
23	CSE, IT	Network Analyst (CCNA) by Cisco Systems Inc
24	CSE, IT	Java Programming (OCJP) and DBMS by Oracle
25	EEE	PLC, Drives and Automation by Siemens
26	EEE	PLC by New Dawn Automation
27	EEE	Home Electrical Certification by APSSDC-SIEMENS
28	Civil	Remote Sensing and GIS by Indian Institute of Remote Sensing

a) The Institution shall offer the certification programs by itself or in collaboration with industry/such other Institutions deemed to have specialized expertise in the proposed area of training.

b) Only students of the Institution shall be eligible to register on payment of prescribed fee.

c) However, subject to availability of resources and the demand the Institution may offer the program to external candidates meeting the pre-qualification requirements and in the order of the merit.

d) The duration of the course and design of the content shall be done by the respective departments of the Institution by themselves or in collaboration with industry/such other institutions deemed to have specialized expertise in the proposed area of training.

e) If the duration of the course is less than or equal to 40 hours, it can be completed in one semester, otherwise, it can suitably distributed over a number of semesters.

f) Mere enrolment/registration for the program shall not entitle any claim for award of certificate.

g) A candidate shall be deemed eligible for the award of the certificate if he/she

- Attends at least 75% of scheduled training sessions
- Complies to all the requirements of submission of the assignments, presentations, seminars, projects, etc., and also appears for periodic tests.
- Shall attain minimum levels of performance in tests as prescribed.
- Shall remit such fee as deemed fit for the certification
- A candidate registered and failed to meet the requirements shall be permitted to repeat the said training one another time after remitting 25% of the fee fixed for the program as re-registration fee.

If the student is absent for the periodic tests, the test shall be re-conducted on payment of 10% of fee.

5. COURSES OFFERED:

Name of the Program	Degree
UG Programs (Engineering & Technology)	B.Tech (Civil) B.Tech.(EEE) B.Tech.(Mech.) B.Tech.(ECE) B.Tech.(CSE) B.Tech.(CHEM) B.Tech.(IT)
PG Programs (Engineering & Technology)	M.Tech.(Structural Engineering) M.Tech. (Power Systems) M.Tech.(PDM) M.Tech.(VLSI) M.Tech.(CN&IS)
Other PG Programs	MBA
Research Programs	Ph.D in Civil, EEE, MECH, ECE, CSE, CHEM, MBA and MATHS

6. DISTRIBUTION AND WEIGHTAGE OF MARKS:

All Theory courses will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment:

- **Subjective tests – 30 Marks**
- **Assignments - 10 Marks**
    - Two subjective tests shall be conducted each for 30 Marks.
    - Each subjective test shall be conducted for 90 Minutes and have 3 questions each for 10 marks (No choice).
    - Average of the two subjective tests shall be considered as performance in internals.
    - Assignments shall be assessed for 10 marks.

Semester End Assessment:

- Semester End examination is for 60 marks (180 min). Question paper contains 5 questions (one from each unit with internal choice). Each question carries 12 marks. A student shall answer all 5 questions.

a) LABORATORY/PRACTICE:

All Laboratory/Practice courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for Semester End Examination.

Internal assessment: (40 Marks)

- Continuous assessment: :20 Marks
- Internal test: :20 Marks

Semester End Assessment: (60 Marks)

- Semester End Examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Both internal and semester end examination shall include assessment of the student on
    - ❑ Knowledge of principles/concepts involved
    - ❑ Experimental design
    - ❑ Result interpretation and analysis
    - ❑ Experimental report

b) DRAWING/DESIGN/ESTIMATION:

These courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end examination.

- Continuous assessment for 20 marks for each unit finally averaged to 20 marks.
- Two internal assessment tests are conducted during the semester which shall be assessed for another 20 marks by taking the average.

c) Research Methodology & IPR shall be evaluated internally for 50 marks by PRC at the end of I semester

d) Mini Project with Seminar shall be evaluated internally for 50 marks by PRC in the II semester

e) For **audit course** a student is deemed to satisfy the minimum contact hours, as prescribed by the department and shall also comply with the requirements for submission of assignments/projects. A student shall also opt for MOOCs and submit the certificate after completion of the course.

f) PROJECT EVALUATION:

Duration is TWO semesters –Minimum of 40 weeks period is mandatory to submit.

- PRC includes HOD and two other senior faculties, one being the guide.
- To register for project work, a student shall complete all the course work requirements of I and II semesters.
- The progress of the work shall be periodically reviewed by PRC.
- The PRC shall authorize /approve change of guide/topic/title as deemed fit.
- A student shall submit Status Report in line with the recommended project calendar as approved by PRC.
- Student has to submit draft copy of thesis/dissertation to PRC, and also shall make an oral presentation. He/she shall publish the work in journal or international conference of repute and relevance.
- A student shall make 5 copies of PRC approved work and submit.
- Candidates who have successfully passed all theory and lab courses shall be eligible for submitting the thesis.
- The thesis shall be adjudicated by the internal & external examiners and Head of the department.
- Student shall be examined for his contributions, knowledge along with the quality of the work through presentations and Viva-voce.
- The assessment of work shall be done on the following lines:
  - **Project phase -I** which includes Problem definition, Literature survey, tool specific knowledge shall be evaluated internally for 100 marks by PRC at the end of III semester.

- **Project phase II** shall be evaluated for 300 marks at the end of IV semester. Out of 300 marks, 120 marks shall be evaluated internally by PRC and remaining 180 marks shall be evaluated externally by the internal and external examiner.

- The evaluation of Project phase II shall be made on the following aspects.
    - Experimental/methodology design
    - Result analysis and interpretations
    - Report writing
    - Presentation
    - Viva-voce

7. ATTENDANCE REGULATIONS:

- A student shall be eligible to appear for end semester examinations, if he or she acquires a minimum of 75% of attendance in aggregate of all the subjects (Theory & Lab.) for the semester.
- Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the college academic committee.
- Shortage of attendance below 65% in aggregate of all the subjects (Theory & Lab) for the semester shall not be condoned.
- Detained student shall seek re- admission for that semester when offered within 4 weeks from the date of commencement of class work.

8. MINIMUM ACADEMIC REQUIREMENTS:

- A student is deemed to have satisfied the minimum academic requirements for a course on securing at least 24 marks out of 60 marks at semester end examination and overall minimum of 50 marks out of 100 marks including internal assessment.

9. GRADING SYSTEM:

Semester Grade Point Average (SGPA) for the current semester which is calculated on the

basis of grade points obtained in all courses, except audit courses and courses in which satisfactory or course continuation has been awarded,

$$SGPA = \Sigma \text{ (course credits earned x Grade points)} / \Sigma \text{ (Total course credits in the semester.}$$

CGPA= Σ (course credits earned x Grade points) up to successfully completed semesters / Σ (Total course credits up to successfully completed semesters)

The UGC recommends a 10-point grading system with the following letter grades as given below:

O	(Outstanding)	10
A+	(Excellent)	9
A	(Very Good)	8
B+	(Good)	7
B	(Above Average)	6
P	(Pass)	5
F	(Fail)	0
Ab	(Absent)	0

- iii. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X 10= 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			**139**

Thus, **SGPA** =139/20 = 6.95

Illustration for CGPA

Semester 1	**Semester 2**	**Semester 3**	**Semester 4**
Credit : 18	Credit : 18	Credit : 16	Credit : 16
SGPA:7.9	SGPA: 7.8	SGPA: 7.6	SGPA: 8.0

Thus, **CGPA** = 18 x 7.9 + 18 x 7.8 + 16 x 7.6 + 16 x 8.0

$$\frac{142.2+140.4+121.6+128}{} = \mathbf{7.83}$$

10. ELIGIBILITY FOR AWARD OF DEGREE:

M.Tech.:

A student shall be eligible for award of the degree if he/she fulfills the following conditions:

1) Successfully completes all the courses prescribed for the Program.
2) CGPA greater than or equal to 5.5(Minimum requirement for Pass),

11. AWARD OF CLASS:

Eligible candidates for the award of M.Tech. Degree shall be placed in one of the following Classes based on CGPA.

Class	CGPA
Distinction	≥ 7.5
First Class	≥ 6.5
Pass Class	≥ 5.5

12. INSTRUCTION DAYS

A semester shall have a minimum of 90 clear instruction days.

13. TRANSFERS FROM OTHER INSTITUTIONS SHALL NOT BE PERMITTED.

14. SUPPLEMENTARY EXAMINATIONS

Supplementary examinations shall be conducted along with regular examinations.

15. WITHHOLDING OF RESULTS

The result of a student shall be withheld

- If the student has not paid the dues, if any, to the institution.
- If any case of pending disciplinary action
- Involvement in any sort of malpractices etc.
- Involvement in ragging.

16. TRANSITORY REGULATIONS

A Candidate shall be readmitted from University regulations to A1 regulations or from A1 regulations to A2 regulations as per the guide lines of JNTUK.

17. AMENDMENTS TO REGULATIONS:

The Academic Council of MVGR College of Engineering (Autonomous) reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations, and/ or Syllabi or any other such matter relating to the requirements of the program which are compatible to the contemporary/emerging trends effectively meeting the needs of society/industry/stake holding groups.

18. Regulations for MALPRACTICES during the conduct of examinations

	Nature of Malpractices/Improper conduct	Punishment
1 (a)	If the candidate possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only. *
(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. *
2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled. *
3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an

		outsider/candidate not on rolls, he will be handed over to the police and a case is registered against him. *
4	If the candidate mishandles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. Also if the answer script is mutilated / damaged disturbing the shape, of the script, answers, the bar code intentionally.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. He shall be debarred from class work and all examinations and be allowed to reregistered for the next subsequent odd or even semester only. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.*
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	The same should be brought to the notice of CE who in turn in consultation with malpractice committee makes decision for cancellation of the performance in that subject. *
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. *
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and

		all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. *
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. *
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. *
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and

		project work and shall not be permitted for the remaining examinations of the subjects of that semester. *
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.*

*

1. General :

- Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
- The academic regulation should be read as a whole for the purpose of any interpretation.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

- ⇨ **Ragging within or outside any educational institution is prohibited.**
- ⇨ **Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student**

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	 2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	 10 Months	+	Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

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Ragging

ABSOLUTELY NO TO RAGGING

1. **Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.**
2. **Ragging entails heavy fines and/or imprisonment.**
3. **Ragging invokes suspension and dismissal from the College.**
4. **Outsiders are prohibited from entering the College and Hostel without permission.**
5. **Girl students must be in their hostel rooms by 7.00 p.m.**
6. **All the students must carry their Identity Cards and show them when demanded**
7. **The Principal and the Wardens may visit the Hostels and inspect the rooms any time.**

PROGRAM STRUCTURE (A2)
M.TECH (STRUCTURAL ENGINEERING)

SEMESTER - I						
S. No	Course Code	Course Title	L	T	P	Credits
1	A2SET101	Advanced Structural Analysis	3	-	-	3
2	A2SET102	Advanced Solid Mechanics	3	-	-	3
3		**Program Elective - I**	3	-	-	3
	A2SET201	Advanced Reinforced Concrete Structures				
	A2SET202	Theory and Applications of Cement Composites				
	A2SET203	Theory of Structural Stability				
4		**Program Elective - II**	3	-	-	3
	A2SET204	Analytical and Numerical Methods for Structural Engineering				
	A2SET205	Structural Health Monitoring				
	A2SET206	Structural Optimization				
5	A2SEL101	Structural Design Lab	-	-	4	2
6	A2SEL102	Advanced Concrete Lab	-	-	4	2
7	A2SET105	Research Methodology and IPR	2	-	-	2
8	A2ACA5XX	Audit Course-I	2	-	-	0
Total Number of Credits						**18**

SEMESTER - II						
S. No	Course Code	Course Title	L	T	P	Credits
1	A2SET103	FEM in Structural Engineering	3	-	-	3
2	A2SET104	Structural Dynamics	3	-	-	3
3		**Program Elective - III**	3	-	-	3
	A2SET207	Advanced Steel Design				
	A2SET208	Design of High Rise Structures				
	A2SET209	Design of Masonry Structures				
4		**Program Elective - IV**	3	-	-	3
	A2SET210	Design of Advanced Concrete Structures				
	A2SET211	Advance Design of Foundation				
	A2SET212	Design of Industrial Structures				
5	A2SEL103	FEM Laboratory (ANSYS)	-	-	4	2
6	A2SEL104	Numerical Analysis Laboratory	-	-	4	2
7	A2SEP401	Mini Project	2	-	-	2
8	A2ACA5XX	Audit Course-II	2	-	-	0
Total Number of Credits						**18**

SEMESTER - III						
S. No	Course Code	Course Title	L	T	P	Credits
1		**Program Elective - V**	3	-	-	3
	A2SET213	Design of Pre-stressed Concrete Structures				
	A2SET214	Mechanics of Composite Materials				
	A2SET215	Fracture Mechanics				
2		**Open Elective**	3	-	-	3
	A2OET301	Business Analytics				
	A2OET302	Composite Materials				
	A2OET303	Cost Management of Engineering Projects				
	A2OET304	Industrial Safety				
	A2OET305	Operations Research				
	A2OET306	Waste to Energy				
3	A2SEP402	Dissertation Phase-I		-	20	10
Total Number of Credits						**16**

SEMESTER - IV						
S. No	Course Code	Course Title	L	T	P	Credits
1	A2SEP403	Dissertation Phase-II		-	32	16
Total Number of Credits						**16**

Audit Courses

1	A2ACA501	Constitution of India
2	A2ACA502	Disaster Management
3	A2ACA503	English for Research Paper Writing
4	A2ACA504	Pedagogy Studies
5	A2ACA505	Personality Development through Life Enlightenment Skills
6	A2ACA506	Sanskrit for Technical Knowledge
7	A2ACA507	Stress Management by Yoga
8	A2ACA508	Value Education

A2SET101	SEMESTER - I	L	T	P	C
	Advanced Structural Analysis	3	-	-	3
	Pre-requisite: Structural Analysis	Total Contact Hours – 45			

SYLLABUS

UNIT – I: INTRODUCTION **8 Hrs**

Introduction to matrix methods of analysis – static indeterminacy and kinematic indeterminacy – degree of freedom – coordinate system – structure idealization – Element stiffness matrix for truss element, beam element and frame element -- local and global coordinates --Transformation of coordinates – load vector.

UNIT – II: STIFFNESS METHOD **8 Hrs**

Assembly of stiffness matrix from element stiffness matrix – direct stiffness method – general procedure – band matrix – semi bandwidth – computer algorithm for assembly by direct stiffness matrix method.

UNIT-III: ANALYSIS OF PLANE TRUSS AND CONTINUOUS BEAMS **10 Hrs**

Analysis of plane truss – continuous beam (kinematic indeterminacy not more than 3) using stiffness method - Effects of Settlements, Temperature Change and Lack of Fit.

UNIT-IV: ANALYSIS OF PLANE FRAME AND GRIDS **10 Hrs**

Analysis of plane frame and grids using stiffness method.

UNIT – V: BOUNDARY VALUE PROBLEMS **9 Hrs**

Boundary Value Problems (BVP): Approximate Solution of Boundary Value Problems, Modified Galerkin's Method for One-Dimensional BVP.

TEXT BOOK:

1. Matrix Analysis of Structures, Robert E. Sennet, Waveland Press Inc.
2. The Finite Element Method, Lewis P. E. and Ward J. P., Addison-Wesley Publication Co.

REFERENCES:

1. Matrix Structural Analysis, William Mcguire, Richard H Gallagher, Ronald D. Ziemian
2. Computer Methods in Structural Analysis, Meek J. L., E & FN Spon Publications.

COURSE OUTCOMES:

CO1. Students will be able to find static and kinematic indeterminacy of the structures and develop stiffness matrix for different types of elements.

CO2. Students will be able to assemble the element stiffness matrices and form global stiffness for the structure.

CO3. Student will be able to analyze continuous beams and plane trusses using direct stiffness method.

CO4. Student will be able to analyze plane frames and grids using direct stiffness method.

CO5. Student will be able to solve boundary value problems.

Course Designed by:	Department of Civil Engineering
Approval	Approved by: Board of Studies Meeting held on 09.07.2019.
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2SET102	SEMESTER - I	L	T	P	C
	Advanced Solid Mechanics	3	-	-	3
	Pre-requisite: Mathematics, Strength of Materials Total Contact Hours – 46				

SYLLABUS

UNIT – I: CONTINUUM MECHANICS AND STRESS FIELD 8 Hrs

Overview of Continuum mechanics and Theory of elasticity – Differences between elementary theory and theory of elasticity – Assumptions – Applications – Types of forces – Concept of three dimensional stress – General state of stress on an element – Differential equation of equilibrium in a general three dimensional stress system – Stress on a general plane : Direction cosines, Axis Deformation – Stress on oblique plane through a point – Stress transformation – Principal stresses and planes.

UNIT –II: DISPLACEMENT AND STRAIN FIELD, CONSTITUTIVE RELATION 10 Hrs

Introduction – Elementary concept of strain – Strain displacement relation – Strain at a point – Strain components at a given point in any direction – Principle strains and their directions – Strain rosettes – Rectangular , Delta – Mohr's circle of strain – Response model – 1-D Hooke's law – Generalized Hooke's law – Non-isotropic linear elastic behaviour - Stress – strain relation for isotropic, orthographic & transverse isotropic material.

UNIT – III: TWO – DIMENSIONAL PROBLEMS OF ELASTICITY IN CARTESIAN AND POLAR COORDINATE SYSTEM 12 Hrs

Two-dimensional state of stress and strain – Plane stress, strain problems – Equation of compatibility – Airey's stress functions – Saint – Venant's principle – Two dimensional problems in Cartesian coordinate – Bending of a beam by uniform load using the stress function as a polynomial.

Two-dimensional differential equation of equilibrium in polar coordinates – Airey's stress function in polar coordinates – Stress-strain relationship in polar coordinates – Strain displacement relations – Compatibility equation – Stresses due to concentrated loads.

UNIT – IV: TORSION ON PRISMATIC BARS 8 Hrs

Introduction – Saint-Venant's theory – Torsion of elliptical cross – section – Torsion of equilateral triangle cross section bar.

UNIT-V: PLASTIC DEFORMATION 8 Hrs

Strain Hardening, Idealized Stress – Strain curve, Yield Criteria, von-Mises Yield Criterion, Tresca Yield Criterion, Plastic Stress- Strain Relations, Principle of Normality and Plastic Potential, Isotropic Hardening.

TEXT BOOK:

1. Theory of Elasticity, Timoshenko S. and Goodier J.N., McGraw Hill, 1961.
2. Engineering Solid Mechanics, Ragab A.R., Beyoumi S.E., CRC Press,1999.

REFERENCES:

1. Theory of Elasticity, Sadhu Singh Khanna Publishers, New Delhi.
2. Continuum Mechanics, Dr. P. N. Chandramouli, Yesdee Publishers.

COURSE OUTCOMES:

Students will have the

CO1. Ability to develop stress-strain relationships using stress tensor and transformation in elastic state.

CO2. Ability to solve simple problems of elasticity understanding the basic concepts.

CO3. Ability to apply numerical methods to solve continuum problems.

CO4. Ability to solve problems of 2D and 3D problems of linear elasticity using boundary value concept.

CO5. Ability to solve simple problems of plasticity understanding the basic concepts.

Course Designed by:	Department of Civil Engineering
Approval	Approved by: Board of Studies Meeting held on 09.07.2019.
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2SET201	SEMESTER - I	L	T	P	C
	Advanced Reinforced Concrete Structures	3	-	-	3
	Pre-requisite: Basic Design of RC Structures Total Contact Hours – 45				

SYLLABUS

UNIT – I: DESIGN OF TWO-WAY SLABS 8 Hrs

Behaviour, Design of simply supported two-way slab, design of continuous two-way slab as per IS 456:2000 and detailing of slab reinforcements.

UNIT – II: DESIGN OF STAIRCASES 8 Hrs

General features, types of staircases, loads on staircase, effective span of staircase as per IS 456:2000, distribution of loading on stairs, design and detailing of dog legged staircase with waist slabs.

UNIT-III: DESIGN OF STRIP AND COMBINED FOOTINGS 10 Hrs

Design and detailing of strip footing, design of combined slab and beam footing, design of combined footing with strap beam.

UNIT-IV: LIMIT STATE OF SERVICEABILITY 10 Hrs

Short-term and long-term deflection of beams and slabs by IS 456: 2000. Estimation of crack width in reinforced concrete members, factors affecting crack width in beams, mechanisms of flexural cracking, calculation of crack width, simple empirical method, estimation of crack width in beams by IS 456:2000, Shrinkage and thermal cracking.

UNIT – V: BIAXIAL BENDING OF SLENDER COLUMNS 9 Hrs

Definition of slender column, reasons for its increasing importance and popularity, behavior of eccentrically loaded slender columns, braced and un-braced single column or a part of rigid frame, moments due to minimum eccentricities in slender columns, design of slender columns as recommended by IS 456 and charts of SP-16, Development of interaction curves.

TEXT BOOK:

1. N. Subramanian, Design of Reinforced Concrete Structures, Oxford Publishers, 2016

REFERENCES:

1. P. C. Varghese, Advanced Reinforced Concrete Design, PHI publishers.

2. S Unnikrishna Pillai and Devdas Menon, Reinforced Concrete Design, Tata McGraw Hill Publishers.

COURSE OUTCOMES:

CO1. Students will be able to design and detail RCC two-way slab.

CO2. Students will be able to design and detail staircases.

CO3. Student will be able to design strip and combined footing.

CO4. Students will be able to find the short-term and long-term deflections and crack width in the beams and slabs.

CO5. Student will be able to analyze and design slender columns as per IS 456:2000.

Course Designed by:	Department of Civil Engineering
Approval	Approved by: Board of Studies Meeting held on 09.07.2019.
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2SET202	SEMESTER - I	L	T	P	C
	Theory and Applications of Cement Composites	3	-	-	3
	Total Contact Hours – 45				

SYLLABUS

UNIT -I: LATEST MATERIALS

Latest Materials in Concrete: Availability, Chemical composition, sustainability, carbon foot prints, pros and cons of materials - Rate analysis of using new materials- Microstructure

UNIT – II: CEMENT COMPOSITES:

Types of Cement Composites, Terminology, Constituent Materials and their Properties, Construction Techniques for Fiber Reinforced Concrete, SIFCON, Polymer Concretes

UNIT – III: MECHANICAL PROPERTIES OF CEMENT COMPOSITES:

Behavior of cement composites in Tension, Compression, Flexure, Shear, Fatigue and Impact, Durability and Corrosion.

UNIT – IV: APPLICATION OF CEMENT COMPOSITES:

FRC and Ferro cement- Housing, Water Storage, Boats and Miscellaneous Structures. Composite Materials- Orthotropic and Anisotropic behavior, Constitutive relationship, Elastic Constants.

UNIT – V: ANALYSIS AND DESIGN OF CEMENT COMPOSITE STRUCTURAL ELEMENTS

Ferro cement, SIFCON and Fibre Reinforced Concrete.

TEXT BOOKS:

1. R. Santhakumar, Concrete Technology, Oxford University Press.
2. A.A. Neville and J. J. Brooks, Concrete Technology, Prentice Hall, New York.

REFERENCE BOOKS:

1. Mechanics of Composite Materials, Jones R. M, 2nd Ed., Taylor and Francis, BSP Books, 1998
2. Ferrocement – Theory and Applications, Pama R. P, IFIC, 1980
3. New Concrete Materials, Swamy R.N., 1st Ed., Chapman & Hall, 1983.

COURSE OUTCOMES:

CO1. Students will be able to know about the latest materials being used in concrete.
CO2. Students will be able to understand constituents of cement composites.
CO3. Student will be able to know about the mechanical properties of cement composites.
CO4. Student will be able to know the application of cement composites.
CO5. Student will be able to analyze and design cement composite structural elements.

Course Designed by:	Department of Civil Engineering
Approval	Approved by: Board of Studies Meeting held on 09.07.2019.
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2SET203	SEMESTER – I	L	T	P	C
	Theory of Structural Stability	3	-	-	3
	Pre-requisites: Strength of Materials Total Contact Hours – 45				

SYLLABUS

UNIT – I: CRITERIA FOR DESIGN OF STRUCTURES 8 Hrs

Stability of equilibrium -Stable, unstable and neutral equilibrium, Approaches for estimating the critical load of a column – Euler approach, Energy approach, Imperfection approach and Dynamic approach, Linear and Nonlinear behavior.

UNIT – II: STABILITY OF COLUMNS 8 Hrs

Axial and Flexural buckling – Concentrated load, udl throughout its span, several concentrated loads. Lateral bracing of columns, torsional buckling, combined axial, flexural and torsional buckling.

UNIT-III: STABILITY OF BEAMS 10 Hrs

Lateral torsional buckling – Rectangular beams, I beam. Warping torsion, St. Venant torsion, combined twisting and warping torsion.

UNIT-IV: STABILITY OF FRAMES 10 Hrs

Modes of buckling, critical load of a frame using neutral equilibrium, member buckling, global buckling, slenderness ratio, effect of primary bending and plasticity on frame behavior.

UNIT – V: STABILITY OF PLATES 9 Hrs

Axial flexural buckling, shear flexural buckling, buckling under combined loads. Introduction to inelastic buckling and dynamic stability.

TEXT BOOK:

1. Theory of Elastic Stability, Timoshenko and Gere, Tata Mc Graw Hill.

REFERENCES:

1. Principles of structural stability Theory, Alexander Chajes, Prentice Hall, New Jersy.
2. Structural stability of columns and plates, Iyengar, N.G.R, Eastern west press Pvt. Ltd.

COURSE OUTCOMES:

CO1. Students will be able to use stability criteria and concepts for analyzing discrete and continuous systems.
CO2. Students will be able to check the stability of columns.
CO3. Student will be able to check stability of beams.
CO4. Student will be able to check stability of frames.
CO5. Student will be able to determine stability of plates.

Course Designed by:	Department of Civil Engineering
Approval	Approved by: Board of Studies Meeting held on 09.07.2019.
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

	SEMESTER - I	L	T	P	C
A2SET204	Analytical and Numerical Methods for Structural Engineering	3	-	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT-I: ERROR ANALYSIS & CURVE FITTING

Approximations and Error Computation: Concepts like accuracy of numbers, significant figures, rounding off, errors, Inherent, rounding, truncation, absolute, relative and percentage errors, errors in approximation of functions errors in series approximation, order of approximation; Curve Fitting: Principle of least squares, Fitting of straight line, fitting second degree parabola, Fitting of power curves, Linearization of nonlinear laws.

UNIT- II: THEORY OF EQUATIONS

Algebraic and transcendental equations, Transformation of equations, reciprocal equations, Concepts like roots, multiplicity of roots, rate of convergence, initial approximations; Methods of solving Algebraic and transcendental equations: Secant method, Iterative method, Newton-Raphson method to calculate single roots, multiple roots and complex roots.

UNIT-III: ADVANCED LINEAR ALGEBRA

Introduction – Methods of Solution - Gauss-Jordan Method –LU Decomposition Method – Iterative Methods to Solve Simultaneous Linear Equations: Gauss-Jacobi Method – Gauss-Seidel Iterative Method – Matrix Eigen Value Problems: Determination of Eigenvalues using Iteration Method – Rayleigh's Power Method.

UNIT-IV: NUMERICAL DIFFERENTIATION AND INTEGRATION

Introduction – Interpolation – Collection of Data – Extrapolation or Prediction – Differentiation in Equi-spaced Interval: Numerical Differentiation using Newton-Gregory Forward Interpolation and Backward Interpolation formula - Differentiation in Unequal Intervals: Numerical Differentiation by using Newton-Gregory Divided Difference Interpolation Formula – Numerical Integration by utilizing Trapezoidal Rule – Simpson's One-third Rule – Weddle's Rule.s.

UNIT-V: NUMERICAL SOLUTION OF ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS

Introduction – Solution of Initial Value Problem using Runge-Kutta Fourth Order Method – Classification of Second Order Partial Differential Equations - Finite Difference Representation of Partial Derivatives – Representation of Derivatives by Diagram –Solution of One Dimensional Heat Equation by an Application of Bender-Schmidt Recurrence Formula and Crank-Nicolson Formula – Solution of Hyperbolic equations (One Dimensional Wave Equation) using Finite Difference Methods such as Explicit Schemes.

TEXT BOOKS:

1. S.S. Sastry, Introductory Methods of Numerical Analysis, PHI Pvt. Ltd., 5th Edition.
2. M.K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International.

REFERENCE BOOKS:

1. Kendall Atkinson, An Introduction to Numerical Analysis, J. Wiley and Sons, 2nd Edition, 1989.
2. Francis Scheid, Theory and Problems of Numerical Analysis, McGraw Hill Book Company.
3. B.S. Grewal, Higher Engineering Mathematics, 42nd Edition, Khanna Publishers.

COURSE OUTCOMES:

At the end of the course, students shall be able to:

CO 1 Find the error that may be present in the solution to a problem, analyze and model experimental or sample data by using statistical tools such as Method of Least Squares.

CO 2 Solve Nonlinear & Transcendental equations utilizing iteration techniques.

CO 3 Solving Simultaneous Linear Equations by using numerical and analytical methods and Find the Largest Eigenvector corresponding to the Largest Eigenvalue numerically.

CO 4 Find Derivatives and Integration of unknown functions using interpolation techniques.

CO 5 Obtain numerical approximations to the solutions of ordinary and partial differential equations using Finite Difference Schemes, as is required in simulations of physical processes.

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 06.07.2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2SET205	SEMESTER – I	L	T	P	C
	Structural Health Monitoring	3	-	-	3
	Total Contact Hours – 45				

SYLLABUS

UNIT-I Introduction to Structural Health Monitoring:
Factors affecting Health of Structures, Causes of Distress, Regular Maintenance. Concepts, Various Measures, Structural Safety in Alteration.

UNIT-II Structural Audit:
Assessment of Health of Structure, Collapse and Investigation, Investigation Management, SHM Procedures.

UNIT-III Static Field Testing: Types of Static Tests, Simulation and Loading Methods, sensor systems and hardware requirements, Static Response Measurement.

UNIT-IV Dynamic Field Testing:
Types of Dynamic Field Test, Stress History Data, Dynamic Response Methods, Hardware for Remote Data Acquisition Systems, Remote Structural Health Monitoring.

UNIT-V Introduction to Repairs and Rehabilitations of Structures:
Case Studies (Site Visits), piezo–electric materials and other smart materials, electro–mechanical impedance (EMI) technique, adaptations of EMI technique

Course Outcomes:
1. Understand the fundamentals of maintenance and repair strategies.
2. Diagnose for serviceability and durability aspects of concrete.
3. Know the materials and techniques used for repair of structures.
4. Decide the appropriate repair, strengthening, rehabilitation and retrofitting technique required for a case study building.
5. Use an appropriate health monitoring technique and demolition technique.

Suggested Reading:

1. Daniel Balageas, Claus-Peter Fritzen, Alfredo Güemes, Structural Health Monitoring, WileyISTE, 2006.
2. Douglas E Adams, Health Monitoring of Structural Materials and Components-Methods with Applications, John Wiley and Sons, 2007.
3. J.P. Ou, H.Li and Z.D. Duan, Structural Health Monitoring and Intelligent Infrastructure-1, Taylor and Francis Group, London, U.K, 2006.
4. Victor Giurglutiu, Structural Health Monitoring with Wafer Active Sensors, Academic Press Inc, 2007.
5. Smart Materials and Structures, Gandhi and Thompson
6. Structural Health Monitoring: Current Status and Perspectives, Fu Ko Chang

Course Designed by:	Department of Civil Engineering
Approval	Approved by: Board of Studies Meeting held on 09.07.2019.
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2SET206	SEMESTER – I	L	T	P	C
	Structural Optimization	3	-	-	3
	Total Contact Hours – 45				

SYLLABUS

UNIT – I: Introduction **7 hrs**

Definitions - Variables - Objective Function - Constraints - Design space - Feasible and infeasible - Convex and Concave - Local and global optima – Classification of Optimization techniques-Formulation of structural optimization problems.

Classical Techniques: Differential calculus - Optimality criteria - Single variable optimization - Multivariable optimization - Lagrange Multiplier method - Khun - Tucker Criteria.

UNIT – II: Linear Programming **8 hrs**

Problem formulation - Graphical solution - Analytical method - Standard form - Slack, surplus and artificial variables - Canonical form - Basic feasible solution - Simplex method - Two phase method - Penalty method - Duality theory - Primal - Dual algorithm.

UNIT-III: Nonlinear Programming **10 hrs**

Unconstrained Nonlinear Programming: Unidimensional - Unimodal function - Exhaustive and unrestricted search-Unconstrained multivariable function – different methods

Constrained Nonlinear Programming: Direct and indirect methods- Cutting plane method - Method of feasible direction - Interior penalty function - Exterior penalty function method.

UNIT-IV: Geometric, Dynamic, Integer and Stochastic Programming **10hrs**

Polynomial - Unconstrained and constrained problems with zero difficulty - Concept of solving problems with one degree of difficulty

Bellman's principle of optimality - Representation of a multistage decision problem - Concept of sub-optimization problems using classical and tabular methods.

Integer Programming –canonical and standard form –Variants –Examples.

Stochastic Programming – Two stage Problems.

UNIT – V: Structural Engineering Applications **10 hrs**

Methods for optimal design of structural elements, continuous beams and single storied frames using plastic theory - Minimum weight design for truss members - Fully stressed design - Optimization principles to design of R.C. structures such as multi-storey buildings, water tanks and bridges. Structural optimization for transient (dynamic) problems.

TEXT BOOK:

1) Rao, S.S. (2014), Engineering Optimization: Theory and Practice, New Age International, New Delhi.

REFERENCES:

1) Raphael T. Haftka, ZaferGürdal, (2012), Elements of Structural Optimization, Series in Solid Mechanics and its Applications, Vol. 11, Springer Science & Business Media, Netherlands.
2) Osvaldo M. Querin, Mariano Victoria, Cristina Alonso Gordoa, Rubén Ansola, PascualMartí, (2017), Topology Design Methods for Structural Optimization, Butterworth-Heinemann.
3) Andrej Cherkaev, (2012), Variational Methods for Structural Optimization, Vol.140, Applied Mathematical Sciences, Springer Science & Business Media, Netherlands.

COURSE OUTCOMES:

CO1. Students will be able to Solve the problems using different optimization methodologies.
CO2. Students will be able to know the importance of classical and modern optimization methodologies
CO3. Students will be able to apply linear and non-linear programming technique for solving optimization problems
CO4. Students will be able to higher programming techniques for solving optimization problems.
CO5. Student will be able to apply Optimization to solve structural Engineering Problems.

Course Designed by:	Department of Civil Engineering
Approval	Approved by: Board of Studies Meeting held on 09.07.2019.
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2SEL101	SEMESTER - I	L	T	P	C
	Structural Design Lab	**-**	**-**	**4**	**2**
	Pre-requisite: Structural Analysis, Design of Concrete Structures **Total Contact Hours – 45**				

SYLLABUS

Design and detailed drawing of complete G+ 3 structures by individual student using any software tools as per relevant IS codes and validate the results with manual calculations and submit a report.

REFERENCES:

1. Illustrated design of reinforced concrete buildings by Dr. S. R. Karve and V.L. Shah
2. Manual for Structural Design Lab, Dept. of Civil Engineering, MVGR College of Engineering

COURSE OUTCOMES:

CO1. Design and Detail all the Structural Components of Frame Buildings.

CO2. Design and Detail complete Multi-Storey Frame Buildings.

Course Designed by:	Department of Civil Engineering
Approval	Approved by: Board of Studies Meeting held on 09.07.2019.
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2SEL102	SEMESTER - I	L	T	P	C
	Advanced Concrete Lab	-	-	4	2
	Prerequisite: Advanced Concrete Technology	Total Contact Hours – 40			

LIST OF EXPERIMENTS

1. Stress-Strain behaviour of different grades of concrete
2. Correlation between cube strength, cylinder strength, split tensile strength and modulus of rupture.
3. Flexural behaviour of RC beams for different flexural reinforcement.
4. Shear behaviour RC beams for different flexural reinforcement.
5. Non-Destructive Testing of Concrete structures using Rebound Hammer, Ultrasonic pulse Velocity
6. Various Workability tests on Self Compacting concrete.
7. Design and testing of RC beams for crack pattern.

REFERENCES:

1. Properties of Concrete, Neville A. M., 5th Edition, Prentice Hall, 2012.
2. Concrete Technology, Shetty M. S., S. Chand and Co., 2006.

COURSE OUTCOMES:

Learners at the end of this course will be able to

CO1. Understand the stress strain behaviour of different grades of concrete.

CO2. Perform Non-destructive tests on existing concrete structures.

CO3. Explain flexural and shear behaviour of RC beams for different flexural reinforcement.

CO4. Test the workability of self-compacting concrete.

Course Designed by:	Department of Civil Engineering
Approval	Approved by: Board of Studies Meeting held on 09.07.2019.
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2SET105	SEMESTER - I	L	T	P	C
	Research Methodology & IPR	3	-	-	3
	Total Contact Hours – 45				

SYLLABUS

UNIT I: INTRODUCTION TO RESEARCH **10 Hrs**

Meaning of Research, objectives of research, types of research, research problem statement, sources and selection of research problem, Approaches of investigation of solutions for research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, data collection, analysis, interpretation, Necessary instrumentations.

UNIT - II: LITERATURE REVIEW **8 Hrs**

Introduction to literature survey, uses of literature review, Effective literature studies approaches, analysis Plagiarism, Research ethics.

UNIT - III: WRITING REPORT **8 Hrs**

Effective technical writing, how to write report and a technical paper, Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

UNIT - IV: INTELLECTUAL PROPERTY RIGHTS **9 Hrs**

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development.

International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT - V: DEVELOPMENT OF IPR **10 Hrs**

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Text Books:

1. C. R. Kothari, “Research Methodology – Methods and Techniques”, New Age International Publishers.
2. Ranjit Kumar, 2nd Edition, “Research Methodology: A Step by Step Guide for beginners”.
3. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd , 2007.

Reference books:

1. Mayall, “Industrial Design”, McGraw Hill, 1992.
2. Niebel, “Product Design”, McGraw Hill, 1974.
3. Asimov, “Introduction to Design”, Prentice Hall, 1962.
4. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “Intellectual Property in New Technological Age”, 2016.
5. T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008

COURSE OUTCOMES:

CO1. Students will be able to get acquaint with types of research, identification of problem statement.

CO2. Student will be able to identify the literature related to research problem and research ethics.

CO3. Students will get acquaint with technical report writing and thesis write up.

CO4. Student will be able to know various types of IPR and common procedures to claim IPR.

CO5. Student will be able to identify and get acquainted with new developments in the field of IPR.

Course designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 09.07.2019.
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

M.Tech(Power Systems)

MAHARAJ VIJAYARAM GAPATHI RAJ COLLEGE OF ENGINEERING(AUTONOMOUS)
Vijayaram Nagar Campus, Chintalavalasa, Vizianagaram-535005, Andhra Pradesh
Accredited by NAAC with 'A' Grade & Listed u/s 2(f) & 12(B) of UGC
(Approved by AICTE, New Delhi and Permanently Affiliated by JNTUK-Kakinada)
NBA Accredited UG Courses: B.Tech(MEC), B.Tech(CIV), B.Tech(EEE), B.Tech(ECE), B.Tech(CSE), B.Tech(IT), B.Tech(MEC) & B.Tech(CHE) and PG Course: MBA

ACADEMIC REGULATIONS & CURRICULUM

M.Tech. (Power Systems)

Applicable to the students admitted from the Academic year 2019-2020

MAHARAJ VIJAYARAM GAJAPATHI RAJ COLLEGE OF ENGINEERING

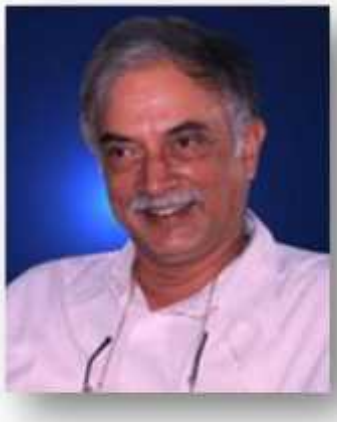
(Autonomous)

(Approved by AICTE, New Delhi, and permanently affiliated to JNTUK, Kakinada)
Re-Accredited by NBA, Re-accredidated by NAAC with 'A' Grade,
Listed u/s 2(f) & 12(B) of UGC Act 1956.
Vijayaram Nagar Campus, Chintalavalasa,
Vizianagaram-535005, Andhra Pradesh

The visionaries

Late Dr. P V G Raju
Raja Saheb of Vizianagaram
Founder Chairman-MANSAS
Ex-Minister for Education and Health, Govt. of AP
Ex Member of Parliament

Late Dr. P. Anand Gajapathi Raju
Ex-Chairman-MANSAS
Ex-Minister for Education and Health
Govt. of AP
Ex Member of Parliament



P. Ashok Gajapathi Raju
Chairman-MANSAS
Ex-Union Minister for Civil Aviation,
Govt. of India
Ex-Minister for Finance, Govt. of AP

Vision

Maharaj Vijayaram Gajapathi Raj College of Engineering strives to become a centre par excellence for technical education where aspiring students can be transformed into skilled and well-rounded professionals with strong understanding of fundamentals, a flair for responsible innovation in engineering practical solutions applying the fundamentals, and confidence and poise to meet the challenges in their chosen professional spheres.

Mission

The management believes imparting quality education in an atmosphere that motivates learning as a social obligation which we owe to the students, their parents/guardians and society at large and hence the effort is to leave no stone unturned in providing the same with all sincerity. Towards that end, the management believes special focus has to be on the following areas:

M1: Have on-board staff with high quality experience and continuously updating themselves with latest research developments and sharing that knowledge with students.

M2: Having a well stream-lined teaching learning process that is continuously assessed for effectiveness and fine-tuned for improvement.

M3: Having state-of-the-art lab and general infrastructure that gives students the necessary tools and means to enhance their knowledge and understanding.

M4: Having a centralized department focused on improving placement opportunities for our students directly on campus and coordinating the training programs for students to Complement the curriculum and enhance their career opportunities.

M5: Having advanced research facilities and more importantly atmosphere to encourage students to pursue self-learning on advanced topics and conduct research.

ABOUT THE INSTITUTION:

Maharajah Alak Narayan Society of Arts and Science (MANSAS) is an Educational Trust founded by Dr. (late) P.V.G Raju, Raja Saheb of Vizianagaram in the hallowed memory of his father Maharajah Alak Narayan Gajapati with a view to confound socio-economic inequalities in the Vizianagaram principality executing a trust deed on 12-11-1958 duly established Maharajah's College and other educational institutions in and around Vizianagaram. The Trust is a charitable one published under Section 6 a (1) of A.P Charitable and Hindu Religious Institutions and Endowment Act 30 of 1987.

The object of the Trust is to manage the properties of educational institutions under it and to promote and advance the cause of education in general, besides awarding scholarships to deserving students enabling them to undergo special training in science and industries in and out of India. The Trust has made an uncompromising contribution to the nation by presenting the stalwarts.

Trust offers KG to PhD level education in Arts, Sciences, Law, Pharmacy, Humanities Education, Engineering and Management and presently houses 13 Educational Institutions. MVGR College of Engineering is one of the 13 Institutes.

Other Institutions under MANSAS

1. M.R. HIGH SCHOOL 1857
2. M.R COLLEGE **(NAAC ACCREDITED)** 1879
3. M.R. COLLEGE OF EDUCATION 1950
4. M.R. WOMENS COLLEGE **(NAAC ACCREDITED)** 1962
5. M.R. GIRLS HIGH SCHOOL 1974
6. M.R. MODEL HIGH SCHOOL 1974
7. M.R. ENGLISH MEDIUM SCHOOL 1979
8. M.R.V.R.G.R LAW COLLEGE 1987
9. M.R. P.G. COLLEGE **(NAAC ACCREDITED)** 1987
10. M.R.SCHOOL OF MANAGEMENT STUDIES 1994
11. M.R.V.R.G.R – II MEMORIAL JR. COLLEGE 1994
12. M.R. COLLEGE OF PHARMACY 2004

Maharaj Vijayaram Gajapathi Raj (MVGR) College of Engineering was established in the year 1997 by Maharaj Alak Narayan Society for Arts and Sciences (MANSAS) to impart quality technical education. The Institution is located in lush green, serene and pollution free environment spread over 60 acres of land in Chintalavalasa village situated in the outskirts of Vizianagaram, a fort city in the north coastal region of Andhra Pradesh.

Institution at a glance:

- MVGR is a 22 years old institution, established in 1997
- All eligible UG Programs (CHEMICAL, CIVIL, CSE, ECE, EEE, IT & MECHANICAL) were re-accredited by NBA.
- MBA program was also re-accredited by NBA.
- Had been re-accredited with Grade ‘A’ by NAAC of UGC
- Has Permanent affiliation with JN Technological University-Kakinada
- Listed under sections 2(f) & 12(b) of UGC act 1956.
- Approved by AICTE-New Delhi
- EIGHT departments are recognized as RESEARCH CENTERS by JNTU-K
- Granted Autonomy by UGC in 2015
- Campus of 60 acre

- Offering 7 UG and 5 M.Tech and MBA program
- About 250 faculty of which 84 Ph.D. Degree holders
- 83 Laboratories with an investment of about 13 crores
- Total built up area of about 7 Lakh sft
- About 42,000 volumes and Access to 8 international online journal packages like IEEE, SPRINGER, etc.
- 1420 Systems & 395 Mbps band width internet facility
- About Rs. 4 crore worth of on-going R&D projects
- Actively involved in civil engineering consultancy work as Third Party Quality Auditor for Vizianagaram Municipality
- WIPRO Recognized technology learning center and MISSION 10X partner institution
- Recognized National Instruments Academy for Training in LabView
- SIRO Recognition by DSIR
- Recognized PTC Centre of Excellence for Creo Training
- Identified by MSME as Business Incubation Centre
- APSSDC-Siemens Technical Skill Development Institute
- Recognized CMs SKILL EXCELLENCY CENTER (SEC)
- Micrsoft Ed-vantage Platinum Partner
- Institutional member of IUCEE
- Institutional Member of CII
- Member, Chamber of Commerce, Vizianagaram
- Green Campus award by Govt. of AP

MVGR College of Engineering is rated as one among the best engineering colleges in the state of Andhra Pradesh as it set up highest standards in all areas of curricular, co-curricular and extra-curricular activities and in students' placements. Based on industry and expert's feedback, the college is updating the curriculum from time to time. The college offers many value added add-on courses students and conducts training programs to meet the industries' requirements.

Academic Regulations for M.Tech. Program

Applicable to the students admitted from the Academic year 2019-20 onwards.

1. PROGRAM STRUCTURE:

M.TECH:

S.No	Category	Credits
1	Program core courses	16
2	Program Elective courses	19
3	Open Electives	3
4	Research Methodology and IPR	2
5	Mini Project with seminar	2
6	Dissertation / Industrial Project	26
7	Audit courses 2	0
	Total	68

Open Elective

1. Business Analytics
2. Composite Materials
3. Cost Management of Engineering Projects
4. Industrial Safety
5. Operations Research
6. Waste to Energy

Audit course 1 & 2

1. Constitution of India
2. Disaster Management
3. English for Research Paper Writing
4. Pedagogy Studies
5. Personality Development through Life Enlightenment Skills.
6. Sanskrit for Technical Knowledge
7. Stress Management by Yoga
8. Value Education

2. PROGRAM PATTERN:

The program is for 2 academic years - 4 semesters.

3. AWARD OF DEGREE:

A student will be declared eligible for the award of degree if he/she fulfills the following academic regulations.

- A student shall be declared eligible for the award of the degree, if he/she pursues a course of study for not less than two academic years and not more than four academic years.

- A student shall register for **68** credits and secure all **68** credits.
- Students who fail to complete Two Years Course of study within Four years shall forfeit their seat and their admission stand cancelled.

4. CERTIFICATION PROGRAMS:

S.No.	Dept	Name of the Program
1	MECH	Windchill 10.2 PDM by Adroitec Engineering Solutions Pvt. Ltd., Hyderabad
2	MECH	Creo 2.0 by PTC
3	MECH	Edgecam by Verosoft, UK
4	MECH	ANSYS Training and Certification by Mechanical Department
5	MECH	AUTOCAD Training and Certification by Mechanical Department
6	MECH	Catia by APSSDC-Dassault Systemes, CM's Center of Excellence
7	MECH	Delmia by APSSDC-Dassault Systemes, CM's Center of Excellence
8	MECH	Simulia by APSSDC-Dassault Systemes, CM's Center of Excellence
9	MECH	2-Wheeler Automobile Certification by APSSDC-SIEMENS
10	MECH	4-Wheeler Automobile Certification by APSSDC-SIEMENS
11	MECH	Welding Certification by APSSDC-SIEMENS
12	MECH	CNC Certification by APSSDC-SIEMENS
13	MECH	Commercial Electrical Certification by APSSDC-SIEMENS
14	MECH	Solid Edge Certification by APSSDC-SIEMENS
15	CHEM	Chemical Process Design and Simulation by Simtech Simulations, Hyderabad
16	ECE	Embedded Systems by ThinkLABS, Mumbai
17	ECE	Labview by National Instruments Systems India Pvt. Ltd.
18	ECE	Unified Technology Learning Program (UTLP) by Wipro Mission 10X
19	CSE, IT	PEGA by Virtusa Corporation
20	CSE, IT	Microsoft technologies by Microsoft Corp.
21	CSE, IT	Ethical Hacking by EC-Council Academia
22	CSE, IT	Java and C by Talent Sprint
23	CSE, IT	Network Analyst (CCNA) by Cisco Systems Inc
24	CSE, IT	Java Programming (OCJP) and DBMS by Oracle
25	EEE	PLC, Drives and Automation by Siemens
26	EEE	PLC by New Dawn Automation
27	EEE	Home Electrical Certification by APSSDC-SIEMENS
28	Civil	Remote Sensing and GIS by Indian Institute of Remote Sensing

a) The Institution shall offer the certification programs by itself or in collaboration with industry/such other Institutions deemed to have specialized expertise in the proposed area of training.

b) Only students of the Institution shall be eligible to register on payment of prescribed fee.

c) However, subject to availability of resources and the demand the Institution may offer the program to external candidates meeting the pre-qualification requirements and in the order of the merit.

d) The duration of the course and design of the content shall be done by the respective departments of the Institution by themselves or in collaboration with industry/such other institutions deemed to have specialized expertise in the proposed area of training.

e) If the duration of the course is less than or equal to 40 hours, it can be completed in one semester, otherwise, it can suitably distributed over a number of semesters.

f) Mere enrolment/registration for the program shall not entitle any claim for award of certificate.

g) A candidate shall be deemed eligible for the award of the certificate if he/she

- Attends at least 75% of scheduled training sessions
- Complies to all the requirements of submission of the assignments, presentations, seminars, projects, etc., and also appears for periodic tests.
- Shall attain minimum levels of performance in tests as prescribed.
- Shall remit such fee as deemed fit for the certification
- A candidate registered and failed to meet the requirements shall be permitted to repeat the said training one another time after remitting 25% of the fee fixed for the program as re-registration fee.

If the student is absent for the periodic tests, the test shall be re-conducted on payment of 10% of fee.

5. COURSES OFFERED:

Name of the Program	Degree
UG Programs (Engineering & Technology)	B.Tech (Civil) B.Tech.(EEE) B.Tech.(Mech.) B.Tech.(ECE) B.Tech.(CSE) B.Tech.(CHEM) B.Tech.(IT)
PG Programs (Engineering & Technology)	M.Tech.(Structural Engineering) M.Tech.(Power Systems) M.Tech.(PDM) M.Tech.(VLSI) M.Tech.(CN&IS)
Other PG Programs	MBA
Research Programs	Ph.D in Civil, EEE, MECH, ECE, CSE, CHEM, MBA and MATHS

6. DISTRIBUTION AND WEIGHTAGE OF MARKS:

All Theory courses will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment:

- **Subjective tests – 30 Marks**
- **Assignments - 10 Marks**
    - Two subjective tests shall be conducted each for 30 Marks.
    - Each subjective test shall be conducted for 90 Minutes and have 3 questions each for 10 marks (No choice).
    - Average of the two subjective tests shall be considered as performance in internals.
    - Assignments shall be assessed for 10 marks.

Semester End Assessment:

- Semester End examination is for 60 marks (180 min). Question paper contains 5 questions (one from each unit with internal choice). Each question carries 12 marks. A student shall answer all 5 questions.

a) LABORATORY/PRACTICE:

All Laboratory/Practice courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for Semester End Examination.

Internal assessment: (40 Marks)

- Continuous assessment: :20 Marks
- Internal test: :20 Marks

Semester End Assessment: (60 Marks)

- Semester End Examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Both internal and semester end examination shall include assessment of the student on
    - ❑ Knowledge of principles/concepts involved
    - ❑ Experimental design
    - ❑ Result interpretation and analysis
    - ❑ Experimental report

b) DRAWING/DESIGN/ESTIMATION:

These courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end examination.

- Continuous assessment for 20 marks for each unit finally averaged to 20 marks.
- Two internal assessment tests are conducted during the semester which shall be assessed for another 20 marks by taking the average.

c) Research Methodology & IPR shall be evaluated internally for 50 marks by PRC at the end of I semester

d) Mini Project with Seminar shall be evaluated internally for 50 marks by PRC in the II semester

e) For **audit course** a student is deemed to satisfy the minimum contact hours, as prescribed by the department and shall also comply with the requirements for submission of assignments/projects. A student shall also opt for MOOCs and submit the certificate after completion of the course.

f) PROJECT EVALUATION:

Duration is TWO semesters –Minimum of 40 weeks period is mandatory to submit.

- PRC includes HOD and two other senior faculties, one being the guide.
- To register for project work, a student shall complete all the course work requirements of I and II semesters.
- The progress of the work shall be periodically reviewed by PRC.
- The PRC shall authorize /approve change of guide/topic/title as deemed fit.
- A student shall submit Status Report in line with the recommended project calendar as approved by PRC.
- Student has to submit draft copy of thesis/dissertation to PRC, and also shall make an oral presentation. He/she shall publish the work in journal or international conference of repute and relevance.
- A student shall make 5 copies of PRC approved work and submit.
- Candidates who have successfully passed all theory and lab courses shall be eligible for submitting the thesis.
- The thesis shall be adjudicated by the internal & external examiners and Head of the department.
- Student shall be examined for his contributions, knowledge along with the quality of the work through presentations and Viva-voce.
- The assessment of work shall be done on the following lines:
  - **Project phase -I** which includes Problem definition, Literature survey, tool specific knowledge shall be evaluated internally for 100 marks by PRC at the end of III semester.

- **Project phase II** shall be evaluated for 300 marks at the end of IV semester. Out of 300 marks, 120 marks shall be evaluated internally by PRC and remaining 180 marks shall be evaluated externally by the internal and external examiner.

- The evaluation of Project phase II shall be made on the following aspects.
    - Experimental/methodology design
    - Result analysis and interpretations
    - Report writing
    - Presentation
    - Viva-voce

7. ATTENDANCE REGULATIONS:

- A student shall be eligible to appear for end semester examinations, if he or she acquires a minimum of 75% of attendance in aggregate of all the subjects (Theory & Lab.) for the semester.
- Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the college academic committee.
- Shortage of attendance below 65% in aggregate of all the subjects (Theory & Lab) for the semester shall not be condoned.
- Detained student shall seek re- admission for that semester when offered within 4 weeks from the date of commencement of class work.

8. MINIMUM ACADEMIC REQUIREMENTS:

- A student is deemed to have satisfied the minimum academic requirements for a course on securing at least 24 marks out of 60 marks at semester end examination and overall minimum of 50 marks out of 100 marks including internal assessment.

9. GRADING SYSTEM:

Semester Grade Point Average (SGPA) for the current semester which is calculated on the basis of grade points obtained in all courses, except audit courses and courses in which satisfactory or course continuation has been awarded,

$$SGPA = \Sigma \text{ (course credits earned x Grade points)} / \Sigma \text{ (Total course credits in the semester.}$$

CGPA= Σ (course credits earned x Grade points) up to successfully completed semesters / Σ (Total course credits up to successfully completed semesters)

The UGC recommends a 10-point grading system with the following letter grades as given below:

O	(Outstanding)	10
A+	(Excellent)	9
A	(Very Good)	8
B+	(Good)	7
B	(Above Average)	6
P	(Pass)	5
F	(Fail)	0
Ab	(Absent)	0

- iii. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X 10= 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			**139**

Thus, **SGPA** =139/20 = 6.95

Illustration for CGPA

Semester 1	**Semester 2**	**Semester 3**	**Semester 4**
Credit : 18	Credit : 18	Credit : 16	Credit : 16
SGPA:7.9	SGPA: 7.8	SGPA: 7.6	SGPA: 8.0

Thus, **CGPA** = 18 x 7.9 + 18 x 7.8 + 16 x 7.6 + 16 x 8.0

$$\frac{142.2+140.4+121.6+128}{} = \mathbf{7.83}$$

10. ELIGIBILITY FOR AWARD OF DEGREE:

M.Tech.:

A student shall be eligible for award of the degree if he/she fulfills the following conditions:

1) Successfully completes all the courses prescribed for the Program.
2) CGPA greater than or equal to 5.5(Minimum requirement for Pass),

11. AWARD OF CLASS:

Eligible candidates for the award of M.Tech. Degree shall be placed in one of the following Classes based on CGPA.

Class	CGPA
Distinction	≥ 7.5
First Class	≥ 6.5
Pass Class	≥ 5.5

12. INSTRUCTION DAYS

A semester shall have a minimum of 90 clear instruction days.

13. TRANSFERS FROM OTHER INSTITUTIONS SHALL NOT BE PERMITTED.

14. SUPPLEMENTARY EXAMINATIONS

Supplementary examinations shall be conducted along with regular examinations.

15. WITHHOLDING OF RESULTS

The result of a student shall be withheld

- If the student has not paid the dues, if any, to the institution.
- If any case of pending disciplinary action
- Involvement in any sort of malpractices etc.
- Involvement in ragging.

16. TRANSITORY REGULATIONS

A Candidate shall be readmitted from University regulations to A1 regulations or from A1 regulations to A2 regulations as per the guide lines of JNTUK.

17. AMENDMENTS TO REGULATIONS:

The Academic Council of MVGR College of Engineering (Autonomous) reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations, and/ or Syllabi or any other such matter relating to the requirements of the program which are compatible to the contemporary/emerging trends effectively meeting the needs of society/industry/stake holding groups.

18. Regulations for MALPRACTICES during the conduct of examinations

	Nature of Malpractices/Improper conduct	Punishment
1 (a)	If the candidate possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only. *
(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. *
2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled. *
3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an

		outsider/candidate not on rolls, he will be handed over to the police and a case is registered against him. *
4	If the candidate mishandles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. Also if the answer script is mutilated / damaged disturbing the shape, of the script, answers, the bar code intentionally.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. He shall be debarred from class work and all examinations and be allowed to reregistered for the next subsequent odd or even semester only. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.*
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	The same should be brought to the notice of CE who in turn in consultation with malpractice committee makes decision for cancellation of the performance in that subject. *
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. *
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and

		all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. *
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. *
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. *
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and

		project work and shall not be permitted for the remaining examinations of the subjects of that semester. *
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.*

*

1. General :

- Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
- The academic regulation should be read as a whole for the purpose of any interpretation.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

- ⇨ **Ragging within or outside any educational institution is prohibited.**
- ⇨ **Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student**

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	 2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	 10 Months	+	Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE MVGR A RAGGING FREE CAMPUS

Ragging

ABSOLUTELY NO TO RAGGING

1. **Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.**
2. **Ragging entails heavy fines and/or imprisonment.**
3. **Ragging invokes suspension and dismissal from the College.**
4. **Outsiders are prohibited from entering the College and Hostel without permission.**
5. **Girl students must be in their hostel rooms by 7.00 p.m.**
6. **All the students must carry their Identity Cards and show them when demanded**
7. **The Principal and the Wardens may visit the Hostels and inspect the rooms any time.**

PROGRAM STRUCTURE

M.Tech. (Power Systems)

SEMESTER - I						
S. No	Course Code	Course Title	L	T	P	Credits
1	A2PST101	Power System Analysis	3	-	-	3
2	A2PST102	Renewable Energy Systems	3	-	-	3
3	A2PST201	Smart grids	3	-	-	3
	A2PST202	High Power Converters				
	A2PST203	Optimal Control Theory				
4	A2PST204	Electrical Power Distribution System	3	-	-	3
	A2PST205	Advanced Control Systems				
	A2PST206	Pulse Width Modulation for PE Converters				
	A2PST207	Electric and Hybrid Vehicles				
5	A2PST105	Research Methodology & IPR	2	-	-	2
6	A2PSL101	Power Systems Lab	-	-	3	2
7	A2PSL102	Renewable Energy Lab	-	-	3	2
8	A2ACA50_	Audit course– I	2	-	-	0
Total Number of Credits						**18**

SEMESTER - II						
S. No	Course Code	Course Title	L	T	P	Credits
1	A2PST103	Digital Protection of Power System	3	-	-	3
2	A2PST104	Power System Dynamics	3	-	-	3
3	A2PST208	Restructured Power Systems	3	-	-	3
	A2PST209	Advanced Digital Signal Processing				
	A2PST210	Dynamics of Electrical Machines				
	A2PST211	Power Apparatus Design				
4	A2PST212	Advanced Micro-Controller Based Systems	3	-	-	3
	A2PST213	SCADA System and Applications				
	A2PST214	Power Quality				
	A2PST215	AI Techniques				
5	A2PSP401	Mini Project with Seminar	-	-	4	2
6	A2PSL103	Power System Protection Lab	-	-	3	2
7	A2PSL104	Power Electronic Applications to Power Systems Lab	-	-	3	2
8	A2ACA50_	Audit course – II	2	-	-	0
Total Number of Credits						**18**

SEMESTER - III						
S. No	Course Code	Course Title	L	T	P	Credits
1	A2PST216	Distributed Generation	3	-	-	3
	A2PST217	FACTS and Custom Power Devices				
	A2PST218	Industrial Load Modelling and Control				
	A2PST219	Dynamics of Linear Systems				
2	A2OET301	Business Analytics	3	-	-	3
	A2OET302	Composite Materials				
	A2OET303	Cost Management of Engineering Projects				
	A2OET304	Industrial Safety				
	A2OET305	Operations Research				
	A2OET306	Waste to Energy				
3	A2PSP402	Dissertation – Phase - I	-	-	20	10
Total Number of Credits						**16**

SEMESTER - IV						
S. No	Course Code	Course Title	L	T	P	Credits
1	A2PSP403	Dissertation – Phase - II	-	-	32	16
Total Number of Credits						**16**

Audit Courses

1	A2ACA501	Constitution of India
2	A2ACA502	Disaster Management
3	A2ACA503	English for Research Paper Writing
4	A2ACA504	Pedagogy Studies
5	A2ACA505	Personality Development through Life Enlightenment Skills
6	A2ACA506	Sanskrit for Technical Knowledge
7	A2ACA507	Stress Management by Yoga
8	A2ACA508	Value Education

A2PST101	SEMESTER - I	L	T	P	C
	POWER SYSTEM ANALYSIS	3	-	-	3
	Total Contact Hours – 45				

SYLLABUS

UNIT - I
Load flow
Overview of Newton-Raphson, Gauss-Siedel, fast decoupled methods, convergence properties, sparsity techniques, handling Q- max violations in constant matrix, inclusion in frequency effects, AVR in load flow, handling of discrete variable in load flow.

UNIT - II
Fault Analysis
Simultaneous faults, open conductors, faults, generalized method of fault analysis.

UNIT - III
Security Analysis
Security state diagram, contingency analysis, generator shift distribution factors, line outage distribution factor, multiple line outages, overload index ranking

UNIT - IV
Power System Equivalents
WARD REI. Equivalents, Sources of errors in measurement, Virtual and Pseudo, Measurement, Observability, Tracking state estimation, WSL method, bad data correction.

UNIT - V
Voltage Stability
Voltage collapse, P-V curve, multiple power flow solution, continuation power flow, optimal multiplies load flow, voltage collapse proximity indices.

Suggested reading

1. J.J. Grainger &W. D. Stevenson, “Power system analysis ”, McGraw Hill ,2003
2. A. R. Bergen & Vijay Vittal , “Power System Analysis” ,Pearson , 2000
3. L.P. Singh , “Advanced Power System Analysis and Dynamics”, New Age International, 2006
4. G.L. Kusic, “Computer aided power system analysis” ,Prentice Hall India, 1986
5. A.J. Wood, “ Power generation, operation and control” , John Wiley, 1994
6. P.M. Anderson, “Faulted power system analysis” , IEEE Press , 1995

Course outcomes- Students will be able to:

1. Calculate voltage phasors at all buses , given the data using various methods of load flow
2. Calculate fault currents in each phase rank various contingencies according to their severity
3. Estimate the bus voltage phasors given various quantities viz. power flow, voltages, taps , CB status etc
4. Estimate closeness to voltage collapse and calculate PV curves using continuation power flow

A2PST101- Power System Analysis	
Course designed by	DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PST102	SEMESTER - I	L	T	P	C
	RENEWABLE ENERGY SYSTEMS	3	-	-	3
	Total Contact Hours – 45				

SYLLABUS

UNIT - I
Introduction, Distributed vs Central Station Generation, Sources of Energy such as Micro-turbines, Internal Combustion Engines.

UNIT - II
Introduction to Solar Energy, Wind Energy, Combined Heat and Power, Hydro Energy

UNIT - III
Tidal Energy, Wave Energy, Geothermal Energy, Biomass and Fuel Cells.

UNIT - IV
Power Electronic Interface with the Grid. Impact of Distributed Generation on the Power System, Power Quality Disturbances

UNIT - V
Transmission System Operation, Protection of Distributed Generators. Economics of Distributed Generation, Case Studies

Suggested reading:-

1. RanjanRakesh, Kothari D.P, Singal K.C, "Renewable Energy Sources and Emerging Technologies", 2nd Ed. Prentice Hall of India ,2011.
2. Math H.Bollen, Fainan Hassan, "Integration of Distributed Generation in the Power System", July 2011, Wiley –IEEE Press.
3. Loi Lei Lai, Tze Fun Chan, "Distributed Generation: Induction and Permanent Magnet Generators", October 2007, Wiley-IEEE Press..
4. Roger A.Messenger, Jerry Ventre, "Photovoltaic System Engineering", 3rd Ed, 2010.
5. James F.Manwell, Jon G.McGowan, Anthony L Rogers, "Wind energy explained: Theory Design and Application", John Wiley and Sons 2nd Ed, 2010

Course Outcomes: Students will be able to:

1. Knowledge about renewable energy
2. Understand the working of distributed generation system in autonomous/grid connected modes
3. Know the Impact of Distributed Generation on Power System

A2PST102- Renewable Energy Systems	
Course designed by	DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PST201	SEMESTER - I	L	T	P	C
	SMART GRIDS (ELECTIVE - I)	3	-	-	3
	Total Contact Hours – 45				

SYLLABUS

UNIT - I
Introduction to Smart Grid, Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Concept of Robust & Self-Healing Grid Present development & International policies in Smart Grid

UNIT - II
Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading(AMR), Outage Management System(OMS), Plug in Hybrid Electric Vehicles(PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation Smart Substations, Substation Automation, Feeder Automation .

UNIT - III
Geographic Information System(GIS), Intelligent Electronic Devices(IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area Measurement System(WAMS) Phase Measurement Unit(PMU)

UNIT - IV
Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit

UNIT - V
Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighbourhood Area, Network (NAN), Wide Area Network (WAN), Bluetooth, ZigBee, GPS, Wi-Fi, Wi-Max based communication, Wireless Mesh Network, Basics of CLOUD Computing & Cyber Security for Smart Grid, Broadband over Power line (BPL), IP based protocols

Suggested reading

1. Ali Keyhani, “Design of smart power grid renewable energy systems”, Wiley IEEE, 2011
2. Clark W. Gellings, “The Smart Grid: Enabling Energy Efficiency and Demand Response”, CRC Press , 2009
3. Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, “Smart Grid: Technology and Applications”, Wiley 2012
4. Stuart Borlase, “Smart Grid: Infrastructure, Technology and solutions “ CRC Press
5. A. G. Phadke, “Synchronized Phasor Measurement and their Applications”, Springer

Course Outcomes - Students will be able to:

1. Appreciate the difference between smart grid & conventional grid
2. Apply smart metering concepts to industrial and commercial installations
3. Formulate solutions in the areas of smart substations, distributed generation and wide area measurements
4. Come up with smart grid solutions using modern communication technologies

A2PST201- SMART GRIDS (ELECTIVE - I)	
Course designed by	DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PST202	SEMESTER - I	L	T	P	C
	HIGH POWER CONVERTERS (ELECTIVE - I)	3	-	-	3
	Total Contact Hours – 45				

SYLLABUS

UNIT - I

Power electronic systems, An overview of PSDs, multipulse diode rectifier, multipulse, SCR rectifier.

UNIT - II

Phase shifting transformers, multilevel voltage source inverters: two level voltage source inverter, cascaded H bridge multilevel inverter.

UNIT - III

Diode clamped multilevel inverters, flying capacitor multilevel inverter, PWM current source inverters

UNIT - IV

DC to DC switch mode converters, AC voltage controllers: Cyclo-converters, Matrix converter, Power Conditioners and UPS.

UNIT - V

Design aspects of converters, protection of devices and circuits

Suggested reading

1. N. Mohan, T. M. Undeland and W. P. Robbins, "Power Electronics: Converter, Applications and Design", John Wiley and Sons, 1989
2. M.H. Rashid, "Power Electronics", Prentice Hall of India, 1994
3. B. K .Bose, "Power Electronics and A.C. Drives", Prentice Hall, 1986
4. Bin Wu, "High power converters and drives", IEEE press, Wiley Enter science

Course Outcomes:- Students will be able to:

1. Learn the characteristics of PSDs such as SCRs, GTOs, IGBTs and use them in practical systems
2. Knowledge of working of multi-level VSIs, DC-DC switched mode converters, cyclo-converters and PWM techniques and the ability to use them properly
3. Acquire knowledge of power conditioners and their applications
4. Ability to design power circuit and protection circuit of PSDs and converters

A2PST202 - HIGH POWER CONVERTERS (ELECTIVE - I)	
Course designed by	DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
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A2PST203	SEMESTER - I	L	T	P	C
	OPTIMAL CONTROL THEORY (ELECTIVE - I)	3	-	-	3
	Total Contact Hours – 45				

SYLLABUS

UNIT - I

Optimal control problems -mathematical models-selection of performance measures, constraints-classification of problem constraints -problem formulation –examples, comparison with static optimization. Calculus of Variations: basic concepts -variation of a functional -extremals –fundamental theorem in calculus of variation -Euler equation

UNIT - II

Piecewise smooth extremals, constrained minimization of functionals –Point constraints, differential equation constraints, isoperimetric constraints, Hamiltonian -necessary conditions for optimal control, problems with different boundary conditions

UNIT - III

Pontryagin's Minimum Principle, State variable inequality constraints, the set of reachable states, Minimum time problems-bang bang control, Minimum Control Effort problem.

UNIT - IV

The nature of the state estimation problem , non-statistical, estimation design with full estimator dimension, non-statistical estimation with reduced estimator design.

UNIT - V

Dynamic Programming -Optimal control law-principle of optimality -Application to decision making problems-routing problem-application to typical optimal control problem, Interpolation, recurrence relation in dynamic programming

Suggested reading

1. Donald E. Kirk, Optimal Control Theory -An Introduction, Prentice-Hall Inc. Englewood Cliffs, New Jersey, 1970.
2. Brian D. O. Anderson, John B. Moore, Optimal Control-Linear Quadratic Methods, Prentice-Hall Inc., New Delhi, 1991.
3. Athans M. and P. L. Falb, Optimal control-An Introduction to the Theory and its Applications, McGraw Hill Inc., New York, 1966.
4. Sage A. P., Optimum Systems Control, Prentice-Hall Inc., Englewood Cliffs, New Jersey, 1968.
5. D. S. Naidu, Optimal Control Systems, CRC Press, New York Washington D. C., 2003.

Course Outcomes: - Students will be able to:

1. Formulate the optimal controller design problem.
2. Apply constrained optimization to various physical systems.
3. Implement optimal control algorithms to track the response of the system through a predefined trajectory

A2PST203 - OPTIMAL CONTROL THEORY (ELECTIVE - I)	
Course designed by	DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
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A2PST204	SEMESTER - I	L	T	P	C
	ELECTRIC POWER DISTRIBUTION SYSTEM (ELECTIVE - II)	3	-	-	3
	Total Contact Hours – 45				

SYLLABUS

UNIT - I
Distribution of Power, Management, Power Loads, Load Forecasting Short-term & Long-term, Power System Loading, Technological Forecasting.

UNIT - II
Advantages of Distribution Management System (D.M.S.) Distribution Automation: Definition, Restoration / Reconfiguration of Distribution Network, Different Methods and Constraints, Power Factor Correction

UNIT - III
Interconnection of Distribution, Control & Communication Systems, Remote Metering, Automatic Meter Reading and its implementation

UNIT - IV
SCADA: Introduction, Block Diagram, SCADA Applied To Distribution Automation. Common Functions of SCADA, Advantages of Distribution Automation through SCADA

UNIT - V
Calculation of Optimum Number of Switches, Capacitors, Optimum Switching Device Placement in Radial Distribution Systems, Sectionalizing Switches – Types, Benefits, Bellman's Optimality Principle, Remote Terminal Units, Energy efficiency in electrical distribution & Monitoring

Suggested reading

1. A.S. Pabla, " Electric Power Distribution", Tata McGraw Hill Publishing Co. Ltd., Fourth Edition.
2. M.K. Khedkar, G.M. Dhole, "A Text Book of Electrical power Distribution Automation", University Science Press, New Delhi
3. Anthony J Panseni, "Electrical Distribution Engineering", CRC Press
4. James Momoh, "Electric Power Distribution, automation, protection & control", CRC Press

Course Outcomes :-Students will be able to:

1. Knowledge of power distribution system
2. Study of Distribution automation and its application in practice
3. To learn SCADA system

A2PST204 - ELECTRIC POWER DISTRIBUTION SYSTEM (ELECTIVE - II)	
Course designed by	DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PST205	SEMESTER - I	L	T	P	C
	ADVANCED CONTROL SYSTEMS (ELECTIVE - II)	3	-	-	3
	Total Contact Hours – 45				

SYLLABUS

UNIT - I

Control system design

Design of Proportional, Integral, Derivative, PI, PID controllers of first, second order systems. Introduction to compensation, Design of Lead, Lag and Lead-Lag compensators using Bode Plot.

UNIT - II

State space analysis

State space representation using physical varibles , phase variables and canonical variables. Diagonalization, Jordan canonical form. Concept of controllability and observability. Controllable phase variable form and observable phase variable form.

UNIT - III

Nonlinear systems

Introduction to non linear systems, describibg function, describing function of nonlinearities, describing function analysis of non linear systems

Phase plane analysis

Introduction to phase plane analysis, singular points, Method of Isoclines for phase trajoctories construction, phase plane analysis of nonlinear systems

UNIT - IV

Stability Analysis:

Concept of stability, Lyapunov theory, stability analysis of the linear continous time invarient systems by Liapunov method, Generation of Lyappunov functions, variable gradient method, krasovski's method.

UNIT - V

State feed back design

Stability improvement by state feddback, necessary and sufficient conditiions for arbitrary pole placement. State regulator, design of state observer

Suggested reading

1. Modern Control Engineering, Fifth edition, Kotsuhiko Ogata, Prentice Hall of India pvt ltd
2. Automatic Control systems by B.C.kuo, PHP.
3. Modern Control system theory- by M.Gopal, New Age International Publications
4. Control systems engineering by I.J.Nagarath and Gopal, New Age International (P) Ltd.
5. C. Edwards and S. Spurgeon, "Sliding Mode Control : Theory and Applications", CRC Press,1998
6. B. Bandyopadhyay, S. Janardhanan and S. Spurgeon, "Advances in Sliding Mode", Springer, 2013

Course Outcomes: - Students will be able to:

1. Identify suitable compensator and controllers to achieve desired specifications.
2. Predict the controllability and observability of the control system by using state space analysis.
3. Analyze Non-linear control systems.
4. Apply modern control techniques to assess system behavior.
5. Design state feedback controllers and state observe
6. Assess the system stability by using Liapunov method

A2PST205 - ADVANCED CONTROL SYSTEMS (ELECTIVE - II)	
Course designed by	DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PST206	SEMESTER - I	L	T	P	C
	PULSE WIDTH MODULATION FOR PE CONVERTERS (ELECTIVE - II)	3	-	-	3
	Total Contact Hours – 45				

SYLLABUS

UNIT - I
Introduction to PE converters, Modulation of one inverter phase leg, Modulation of single phase VSI and 3 phase VSI

UNIT - II
Zero space vector placement modulation strategies, Losses-Discontinuous modulation, Modulation of CSI

UNIT - III
Over modulation of converters, Programme modulation strategies

UNIT - IV
Pulse width modulation for multilevel inverters, Implementation of modulation controller

UNIT - V
Continuing developments in modulation as random PWM, PWM for voltage unbalance, Effect of minimum pulse width and dead time

Suggested reading

1. D. Grahame Holmes, Thomas A. Lipo, "Pulse width modulation of Power Converter: Principles and Practice", John Wiley & Sons, 03-Oct-2003
2. Bin Vew, "High Power Converter", Wiley Publication
3. Marian K. Kazimicrczuk, "Pulse width modulated dc-dc power converter", Wiley Publication

Course Outcomes :-Students will be able to:

1. Appreciate importance of PWM techniques
2. Implement PWM using different strategies
3. Control CSI and VSI using PWM
4. Compare performance of converter for different PWM techniques

A2PST206 - PULSE WIDTH MODULATION FOR PE CONVERTERS (ELECTIVE - II)	
Course designed by	DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PST207	SEMESTER - I	L	T	P	C
	ELECTRIC AND HYBRID VECHILES (ELECTIVE - II)	3	-	-	3
	Total Contact Hours – 45				

SYLLABUS

UNIT - I

History of hybrid and electric vehicles, Social and environmental importance of hybrid and electric vehicles, Impact of modern drive-trains on energy supplies, Basics of vehicle performance, vehicle power source characterization Transmission characteristics, Mathematical models to describe vehicle performance

UNIT - II

Basic concept of hybrid traction, Introduction to various hybrid drive-train topologies, Power flow control in hybrid drive-train topologies, Fuel efficiency analysis.

UNIT - III

Basic concept of hybrid traction, Introduction to various hybrid drive-train topologies, Power flow control in hybrid drive-train topologies, Fuel efficiency analysis.

UNIT - IV

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Introduction Motor drives configuration and control of Permanent Magnet Motor drives Configuration and control of Switch Reluctance, Motor drives, drive system efficiency

UNIT - V

Introduction to energy management and their strategies used in hybrid and electric vehicle, Classification of different energy management strategies Comparison of different energy management strategies Implementation issues of energy strategies

Suggested reading

1. Sira -Ramirez, R. Silva Ortigoza, "Control Design Techniques in Power Electronics Devices", Springer.
2. Siew-Chong Tan, Yuk-Ming Lai, Chi Kong Tse, "Sliding mode control of switching Power Converters"

Course Outcomes :- Students will be able to:

1. Acquire knowledge about fundamental concepts, principles, analysis and design of hybrid and electric vehicles.
2. To learn electric drive in vehicles / traction.

A2PST207 - ELECTRIC AND HYBRID VECHILES (ELECTIVE - II)	
Course designed by	DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PSL101	SEMESTER - I	L	T	P	C
	POWER SYSTEMS LAB	-	-	3	2
	Total Contact Hours – 45				

LIST OF EXPERIMENTS.

1. Determination of Sequence impedance of an Alternator by fault Analysis.
2. Power angle characteristics of a salient pole Synchronous Machine
3. Measurement of Sequence Impedance of a 3 phase Transformer.
4. ABCD parameter of a transmission line.
5. Break down characteristics of a Sphere gap.
6. Load Flow Studies
7. Determination of leakage current of pin insulator.
8. Voltage distribution across the string insulator.
9. Determination of breakdown strength of transformer oil.
10. Load Forecasting and Unit Commitment
11. Measurement of earth resistance.

A2PSL102	SEMESTER - I	L	T	P	C
	RENEWABLE ENERGY LAB	-	-	3	2
	Total Contact Hours – 45				

LIST OF EXPERIMENTS.

1. Single PV module I-V and P-V characteristics with radiation and temperature changing effect.
2. I-V and P-V characteristics with series and parallel combination of modules.
3. Finding MPP by varying the resistive load by varying the duty cycle of DC-DC converter.
4. Effect of shading and Effect of tilt angle on I-V and P-V characteristics of solar module.
5. Observe the output voltage waveform of inverter in auto mode.
6. Observe the RMS value and waveform of output voltage with both 180^{o} and 120^{0} control.
7. Effect of Temperature on Solar Panel Output
8. Effect of Load on Solar Panel Output
9. Transient and Small Signal Stability Analysis: Single-Machine Infinite Bus System
10. Obtaining of PV & PQ curve for a given power system with load buses and Voltage instability analysis

A2PST105	SEMESTER - I	L	T	P	C
	RESEARCH METHODOLOGY & IPR	2	-	-	2
	Total Contact Hours – 45				

COURSE OBJECTIVES	
COBJ1	To understand upcoming technology of hybrid system
COBJ2.	To understand different aspects of drives application
COBJ3.	Learn about electric Traction

SYLLABUS

UNIT - I

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT - II

Effective literature studies approach, analysis, Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT - III

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT - IV

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT - V

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge, Case Studies.

References:

1. Stuart Melville and Wayne Goddard, “Research methodology: an introduction for science & engineering students’”
2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”
3. Ranjit Kumar, 2nd Edition , “Research Methodology: A Step by Step Guide for beginners”
4. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd ,2007.
5. Mayall , “Industrial Design”, McGraw Hill, 1992.
6. Niebel , “Product Design”, McGraw Hill, 1974.
7. Asimov , “Introduction to Design”, Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “ Intellectual Property in New Technological Age”, 2016.
9. T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008

Course Outcomes: At the end of this course, students will be able to

1. Understand research problem formulation.
2. Analyze research related information
3. Follow research ethics
4. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.

A2PST105 - RESEARCH METHODOLOGY & IPR	
Course designed by	DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29.06.19
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M.Tech (PDM)

MAHARAJ VIJAYARAM GAPATHI RAJ COLLEGE OF ENGINEERING(AUTONOMOUS)
Vijayaram Nagar Campus, Chintalavalasa, Vizianagaram-535005, Andhra Pradesh
Accredited by NAAC with 'A' Grade & Listed u/s 2(f) & 12(B) of UGC
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NBA Accredited UG Courses: B.Tech(MEC), B.Tech(CIV), B.Tech(EEE), B.Tech(ECE), B.Tech(CSE), B.Tech(IT), B.Tech(MEC) & B.Tech(CHE) and PG Course: MBA

ACADEMIC REGULATIONS & CURRICULUM

M.Tech. (Product Design and Manufacturing)

Applicable to the students admitted from the
Academic year 2019-2020

MAHARAJ VIJAYARAM GAJAPATHI RAJ COLLEGE OF ENGINEERING

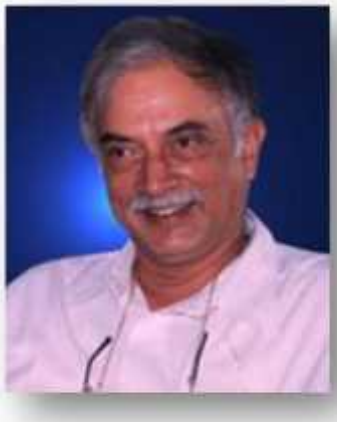
(Autonomous)

(Approved by AICTE, New Delhi, and permanently affiliated to JNTUK, Kakinada)
Re-Accredited by NBA, Re-accredidated by NAAC with 'A' Grade,
Listed u/s 2(f) & 12(B) of UGC Act 1956.
Vijayaram Nagar Campus, Chintalavalasa,
Vizianagaram-535005, Andhra Pradesh

The visionaries

Late Dr. P V G Raju
Raja Saheb of Vizianagaram
Founder Chairman-MANSAS
Ex-Minister for Education and Health, Govt. of AP
Ex Member of Parliament

Late Dr. P. Anand Gajapathi Raju
Ex-Chairman-MANSAS
Ex-Minister for Education and Health
Govt. of AP
Ex Member of Parliament



P. Ashok Gajapathi Raju
Chairman-MANSAS
Ex-Union Minister for Civil Aviation,
Govt. of India
Ex-Minister for Finance, Govt. of AP

Vision

Maharaj Vijayaram Gajapathi Raj College of Engineering strives to become a centre par excellence for technical education where aspiring students can be transformed into skilled and well-rounded professionals with strong understanding of fundamentals, a flair for responsible innovation in engineering practical solutions applying the fundamentals, and confidence and poise to meet the challenges in their chosen professional spheres.

Mission

The management believes imparting quality education in an atmosphere that motivates learning as a social obligation which we owe to the students, their parents/guardians and society at large and hence the effort is to leave no stone unturned in providing the same with all sincerity. Towards that end, the management believes special focus has to be on the following areas:

M1: Have on-board staff with high quality experience and continuously updating themselves with latest research developments and sharing that knowledge with students.

M2: Having a well stream-lined teaching learning process that is continuously assessed for effectiveness and fine-tuned for improvement.

M3: Having state-of-the-art lab and general infrastructure that gives students the necessary tools and means to enhance their knowledge and understanding.

M4: Having a centralized department focused on improving placement opportunities for our students directly on campus and coordinating the training programs for students to Complement the curriculum and enhance their career opportunities.

M5: Having advanced research facilities and more importantly atmosphere to encourage students to pursue self-learning on advanced topics and conduct research.

ABOUT THE INSTITUTION:

Maharajah Alak Narayan Society of Arts and Science (MANSAS) is an Educational Trust founded by Dr. (late) P.V.G Raju, Raja Saheb of Vizianagaram in the hallowed memory of his father Maharajah Alak Narayan Gajapati with a view to confound socio-economic inequalities in the Vizianagaram principality executing a trust deed on 12-11-1958 duly established Maharajah's College and other educational institutions in and around Vizianagaram. The Trust is a charitable one published under Section 6 a (1) of A.P Charitable and Hindu Religious Institutions and Endowment Act 30 of 1987.

The object of the Trust is to manage the properties of educational institutions under it and to promote and advance the cause of education in general, besides awarding scholarships to deserving students enabling them to undergo special training in science and industries in and out of India. The Trust has made an uncompromising contribution to the nation by presenting the stalwarts.

Trust offers KG to PhD level education in Arts, Sciences, Law, Pharmacy, Humanities Education, Engineering and Management and presently houses 13 Educational Institutions. MVGR College of Engineering is one of the 13 Institutes.

Other Institutions under MANSAS

1. M.R. HIGH SCHOOL 1857
2. M.R COLLEGE **(NAAC ACCREDITED)** 1879
3. M.R. COLLEGE OF EDUCATION 1950
4. M.R. WOMENS COLLEGE **(NAAC ACCREDITED)** 1962
5. M.R. GIRLS HIGH SCHOOL 1974
6. M.R. MODEL HIGH SCHOOL 1974
7. M.R. ENGLISH MEDIUM SCHOOL 1979
8. M.R.V.R.G.R LAW COLLEGE 1987
9. M.R. P.G. COLLEGE **(NAAC ACCREDITED)** 1987
10. M.R.SCHOOL OF MANAGEMENT STUDIES 1994
11. M.R.V.R.G.R – II MEMORIAL JR. COLLEGE 1994
12. M.R. COLLEGE OF PHARMACY 2004

Maharaj Vijayaram Gajapathi Raj (MVGR) College of Engineering was established in the year 1997 by Maharaj Alak Narayan Society for Arts and Sciences (MANSAS) to impart quality technical education. The Institution is located in lush green, serene and pollution free environment spread over 60 acres of land in Chintalavalasa village situated in the outskirts of Vizianagaram, a fort city in the north coastal region of Andhra Pradesh.

Institution at a glance:

- MVGR is a 22 years old institution, established in 1997
- All eligible UG Programs (CHEMICAL, CIVIL, CSE, ECE, EEE, IT & MECHANICAL) were re-accredited by NBA.
- MBA program was also re-accredited by NBA.
- Had been re-accredited with Grade ‘A’ by NAAC of UGC
- Has Permanent affiliation with JN Technological University-Kakinada
- Listed under sections 2(f) & 12(b) of UGC act 1956.
- Approved by AICTE-New Delhi
- EIGHT departments are recognized as RESEARCH CENTERS by JNTU-K
- Granted Autonomy by UGC in 2015
- Campus of 60 acre

- Offering 7 UG and 5 M.Tech and MBA program
- About 250 faculty of which 84 Ph.D. Degree holders
- 83 Laboratories with an investment of about 13 crores
- Total built up area of about 7 Lakh sft
- About 42,000 volumes and Access to 8 international online journal packages like IEEE, SPRINGER, etc.
- 1420 Systems & 395 Mbps band width internet facility
- About Rs. 4 crore worth of on-going R&D projects
- Actively involved in civil engineering consultancy work as Third Party Quality Auditor for Vizianagaram Municipality
- WIPRO Recognized technology learning center and MISSION 10X partner institution
- Recognized National Instruments Academy for Training in LabView
- SIRO Recognition by DSIR
- Recognized PTC Centre of Excellence for Creo Training
- Identified by MSME as Business Incubation Centre
- APSSDC-Siemens Technical Skill Development Institute
- Recognized CMs SKILL EXCELLENCY CENTER (SEC)
- Micrsoft Ed-vantage Platinum Partner
- Institutional member of IUCEE
- Institutional Member of CII
- Member, Chamber of Commerce, Vizianagaram
- Green Campus award by Govt. of AP

MVGR College of Engineering is rated as one among the best engineering colleges in the state of Andhra Pradesh as it set up highest standards in all areas of curricular, co-curricular and extra-curricular activities and in students' placements. Based on industry and expert's feedback, the college is updating the curriculum from time to time. The college offers many value added add-on courses students and conducts training programs to meet the industries' requirements.

Academic Regulations for M.Tech. Program

Applicable to the students admitted from the Academic year 2019-20 onwards.

1. PROGRAM STRUCTURE:

M.TECH:

S.No	Category	Credits
1	Program core courses	16
2	Program Elective courses	19
3	Open Electives	3
4	Research Methodology and IPR	2
5	Mini Project with seminar	2
6	Dissertation / Industrial Project	26
7	Audit courses 2	0
	Total	68

Open Elective

1. Business Analytics
2. Composite Materials
3. Cost Management of Engineering Projects
4. Industrial Safety
5. Operations Research
6. Waste to Energy

Audit course 1 & 2

1. Constitution of India
2. Disaster Management
3. English for Research Paper Writing
4. Pedagogy Studies
5. Personality Development through Life Enlightenment Skills.
6. Sanskrit for Technical Knowledge
7. Stress Management by Yoga
8. Value Education

2. PROGRAM PATTERN:

The program is for 2 academic years - 4 semesters.

3. AWARD OF DEGREE:

A student will be declared eligible for the award of degree if he/she fulfills the following academic regulations.

- A student shall be declared eligible for the award of the degree, if he/she pursues a course of study for not less than two academic years and not more than four academic years.

- A student shall register for **68** credits and secure all **68** credits.
- Students who fail to complete Two Years Course of study within Four years shall forfeit their seat and their admission stand cancelled.

4. CERTIFICATION PROGRAMS:

S.No.	Dept	Name of the Program
1	MECH	Windchill 10.2 PDM by Adroitec Engineering Solutions Pvt. Ltd., Hyderabad
2	MECH	Creo 2.0 by PTC
3	MECH	Edgecam by Verosoft, UK
4	MECH	ANSYS Training and Certification by Mechanical Department
5	MECH	AUTOCAD Training and Certification by Mechanical Department
6	MECH	Catia by APSSDC-Dassault Systemes, CM's Center of Excellence
7	MECH	Delmia by APSSDC-Dassault Systemes, CM's Center of Excellence
8	MECH	Simulia by APSSDC-Dassault Systemes, CM's Center of Excellence
9	MECH	2-Wheeler Automobile Certification by APSSDC-SIEMENS
10	MECH	4-Wheeler Automobile Certification by APSSDC-SIEMENS
11	MECH	Welding Certification by APSSDC-SIEMENS
12	MECH	CNC Certification by APSSDC-SIEMENS
13	MECH	Commercial Electrical Certification by APSSDC-SIEMENS
14	MECH	Solid Edge Certification by APSSDC-SIEMENS
15	CHEM	Chemical Process Design and Simulation by Simtech Simulations, Hyderabad
16	ECE	Embedded Systems by ThinkLABS, Mumbai
17	ECE	Labview by National Instruments Systems India Pvt. Ltd.
18	ECE	Unified Technology Learning Program (UTLP) by Wipro Mission 10X
19	CSE, IT	PEGA by Virtusa Corporation
20	CSE, IT	Microsoft technologies by Microsoft Corp.
21	CSE, IT	Ethical Hacking by EC-Council Academia
22	CSE, IT	Java and C by Talent Sprint
23	CSE, IT	Network Analyst (CCNA) by Cisco Systems Inc
24	CSE, IT	Java Programming (OCJP) and DBMS by Oracle
25	EEE	PLC, Drives and Automation by Siemens
26	EEE	PLC by New Dawn Automation
27	EEE	Home Electrical Certification by APSSDC-SIEMENS
28	Civil	Remote Sensing and GIS by Indian Institute of Remote Sensing

a) The Institution shall offer the certification programs by itself or in collaboration with industry/such other Institutions deemed to have specialized expertise in the proposed area of training.

b) Only students of the Institution shall be eligible to register on payment of prescribed fee.

c) However, subject to availability of resources and the demand the Institution may offer the program to external candidates meeting the pre-qualification requirements and in the order of the merit.

d) The duration of the course and design of the content shall be done by the respective departments of the Institution by themselves or in collaboration with industry/such other institutions deemed to have specialized expertise in the proposed area of training.

e) If the duration of the course is less than or equal to 40 hours, it can be completed in one semester, otherwise, it can suitably distributed over a number of semesters.

f) Mere enrolment/registration for the program shall not entitle any claim for award of certificate.

g) A candidate shall be deemed eligible for the award of the certificate if he/she

- Attends at least 75% of scheduled training sessions
- Complies to all the requirements of submission of the assignments, presentations, seminars, projects, etc., and also appears for periodic tests.
- Shall attain minimum levels of performance in tests as prescribed.
- Shall remit such fee as deemed fit for the certification
- A candidate registered and failed to meet the requirements shall be permitted to repeat the said training one another time after remitting 25% of the fee fixed for the program as re-registration fee.

If the student is absent for the periodic tests, the test shall be re-conducted on payment of 10% of fee.

5. COURSES OFFERED:

Name of the Program	Degree
UG Programs (Engineering & Technology)	B.Tech (Civil) B.Tech.(EEE) B.Tech.(Mech.) B.Tech.(ECE) B.Tech.(CSE) B.Tech.(CHEM) B.Tech.(IT)
PG Programs (Engineering & Technology)	M.Tech.(Structural Engineering) M.Tech.(Power Systems) M.Tech.(PDM) M.Tech.(VLSI) M.Tech.(CN&IS)
Other PG Programs	MBA
Research Programs	Ph.D in Civil, EEE, MECH, ECE, CSE, CHEM, MBA and MATHS

6. DISTRIBUTION AND WEIGHTAGE OF MARKS:

All Theory courses will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment:

- **Subjective tests – 30 Marks**
- **Assignments - 10 Marks**
    - Two subjective tests shall be conducted each for 30 Marks.
    - Each subjective test shall be conducted for 90 Minutes and have 3 questions each for 10 marks (No choice).
    - Average of the two subjective tests shall be considered as performance in internals.
    - Assignments shall be assessed for 10 marks.

Semester End Assessment:

- Semester End examination is for 60 marks (180 min). Question paper contains 5 questions (one from each unit with internal choice). Each question carries 12 marks. A student shall answer all 5 questions.

a) LABORATORY/PRACTICE:

All Laboratory/Practice courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for Semester End Examination.

Internal assessment: (40 Marks)

- Continuous assessment: :20 Marks
- Internal test: :20 Marks

Semester End Assessment: (60 Marks)

- Semester End Examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Both internal and semester end examination shall include assessment of the student on
    - ❑ Knowledge of principles/concepts involved
    - ❑ Experimental design
    - ❑ Result interpretation and analysis
    - ❑ Experimental report

b) DRAWING/DESIGN/ESTIMATION:

These courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end examination.

- Continuous assessment for 20 marks for each unit finally averaged to 20 marks.
- Two internal assessment tests are conducted during the semester which shall be assessed for another 20 marks by taking the average.

c) Research Methodology & IPR shall be evaluated internally for 50 marks by PRC at the end of I semester

d) Mini Project with Seminar shall be evaluated internally for 50 marks by PRC in the II semester

e) For **audit course** a student is deemed to satisfy the minimum contact hours, as prescribed by the department and shall also comply with the requirements for submission of assignments/projects. A student shall also opt for MOOCs and submit the certificate after completion of the course.

f) PROJECT EVALUATION:

Duration is TWO semesters –Minimum of 40 weeks period is mandatory to submit.

- PRC includes HOD and two other senior faculties, one being the guide.
- To register for project work, a student shall complete all the course work requirements of I and II semesters.
- The progress of the work shall be periodically reviewed by PRC.
- The PRC shall authorize /approve change of guide/topic/title as deemed fit.
- A student shall submit Status Report in line with the recommended project calendar as approved by PRC.
- Student has to submit draft copy of thesis/dissertation to PRC, and also shall make an oral presentation. He/she shall publish the work in journal or international conference of repute and relevance.
- A student shall make 5 copies of PRC approved work and submit.
- Candidates who have successfully passed all theory and lab courses shall be eligible for submitting the thesis.
- The thesis shall be adjudicated by the internal & external examiners and Head of the department.
- Student shall be examined for his contributions, knowledge along with the quality of the work through presentations and Viva-voce.
- The assessment of work shall be done on the following lines:
  - **Project phase -I** which includes Problem definition, Literature survey, tool specific knowledge shall be evaluated internally for 100 marks by PRC at the end of III semester.

- **Project phase II** shall be evaluated for 300 marks at the end of IV semester. Out of 300 marks, 120 marks shall be evaluated internally by PRC and remaining 180 marks shall be evaluated externally by the internal and external examiner.

- The evaluation of Project phase II shall be made on the following aspects.
    - Experimental/methodology design
    - Result analysis and interpretations
    - Report writing
    - Presentation
    - Viva-voce

7. ATTENDANCE REGULATIONS:

- A student shall be eligible to appear for end semester examinations, if he or she acquires a minimum of 75% of attendance in aggregate of all the subjects (Theory & Lab.) for the semester.
- Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the college academic committee.
- Shortage of attendance below 65% in aggregate of all the subjects (Theory & Lab) for the semester shall not be condoned.
- Detained student shall seek re- admission for that semester when offered within 4 weeks from the date of commencement of class work.

8. MINIMUM ACADEMIC REQUIREMENTS:

- A student is deemed to have satisfied the minimum academic requirements for a course on securing at least 24 marks out of 60 marks at semester end examination and overall minimum of 50 marks out of 100 marks including internal assessment.

9. GRADING SYSTEM:

Semester Grade Point Average (SGPA) for the current semester which is calculated on the basis of grade points obtained in all courses, except audit courses and courses in which satisfactory or course continuation has been awarded,

$$SGPA = \Sigma \text{ (course credits earned x Grade points)} / \Sigma \text{ (Total course credits in the semester.}$$

CGPA= Σ (course credits earned x Grade points) up to successfully completed semesters / Σ (Total course credits up to successfully completed semesters)

The UGC recommends a 10-point grading system with the following letter grades as given below:

O	(Outstanding)	10
A+	(Excellent)	9
A	(Very Good)	8
B+	(Good)	7
B	(Above Average)	6
P	(Pass)	5
F	(Fail)	0
Ab	(Absent)	0

- iii. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X 10= 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			**139**

Thus, **SGPA** =139/20 = 6.95

Illustration for CGPA

Semester 1	**Semester 2**	**Semester 3**	**Semester 4**
Credit : 18	Credit : 18	Credit : 16	Credit : 16
SGPA:7.9	SGPA: 7.8	SGPA: 7.6	SGPA: 8.0

Thus, **CGPA** = 18 x 7.9 + 18 x 7.8 + 16 x 7.6 + 16 x 8.0

$$\frac{142.2+140.4+121.6+128}{} = \mathbf{7.83}$$

10. ELIGIBILITY FOR AWARD OF DEGREE:

M.Tech.:

A student shall be eligible for award of the degree if he/she fulfills the following conditions:

1) Successfully completes all the courses prescribed for the Program.
2) CGPA greater than or equal to 5.5(Minimum requirement for Pass),

11. AWARD OF CLASS:

Eligible candidates for the award of M.Tech. Degree shall be placed in one of the following Classes based on CGPA.

Class	CGPA
Distinction	≥ 7.5
First Class	≥ 6.5
Pass Class	≥ 5.5

12. INSTRUCTION DAYS

A semester shall have a minimum of 90 clear instruction days.

13. TRANSFERS FROM OTHER INSTITUTIONS SHALL NOT BE PERMITTED.

14. SUPPLEMENTARY EXAMINATIONS

Supplementary examinations shall be conducted along with regular examinations.

15. WITHHOLDING OF RESULTS

The result of a student shall be withheld

- If the student has not paid the dues, if any, to the institution.
- If any case of pending disciplinary action
- Involvement in any sort of malpractices etc.
- Involvement in ragging.

16. TRANSITORY REGULATIONS

A Candidate shall be readmitted from University regulations to A1 regulations or from A1 regulations to A2 regulations as per the guide lines of JNTUK.

17. AMENDMENTS TO REGULATIONS:

The Academic Council of MVGR College of Engineering (Autonomous) reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations, and/ or Syllabi or any other such matter relating to the requirements of the program which are compatible to the contemporary/emerging trends effectively meeting the needs of society/industry/stake holding groups.

18. Regulations for MALPRACTICES during the conduct of examinations

	Nature of Malpractices/Improper conduct	Punishment
1 (a)	If the candidate possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only. *
(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. *
2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled. *
3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an

		outsider/candidate not on rolls, he will be handed over to the police and a case is registered against him. *
4	If the candidate mishandles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. Also if the answer script is mutilated / damaged disturbing the shape, of the script, answers, the bar code intentionally.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. He shall be debarred from class work and all examinations and be allowed to reregistered for the next subsequent odd or even semester only. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.*
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	The same should be brought to the notice of CE who in turn in consultation with malpractice committee makes decision for cancellation of the performance in that subject. *
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. *
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and

		all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. *
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. *
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. *
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and

		project work and shall not be permitted for the remaining examinations of the subjects of that semester. *
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.*

*

1. General :

- Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
- The academic regulation should be read as a whole for the purpose of any interpretation.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

- ⇨ **Ragging within or outside any educational institution is prohibited.**
- ⇨ **Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student**

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	 2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	 10 Months	+	Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE MVGR A RAGGING FREE CAMPUS

Ragging

ABSOLUTELY NO TO RAGGING

1. **Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.**
2. **Ragging entails heavy fines and/or imprisonment.**
3. **Ragging invokes suspension and dismissal from the College.**
4. **Outsiders are prohibited from entering the College and Hostel without permission.**
5. **Girl students must be in their hostel rooms by 7.00 p.m.**
6. **All the students must carry their Identity Cards and show them when demanded**
7. **The Principal and the Wardens may visit the Hostels and inspect the rooms any time.**

PRODUCT DESIGN AND MANUFACTURING (PDM)
PROGRAM STRUCTURE

SEMESTER - I						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2PDT101	Product design	3	-	-	3
2	A2PDT102	Advanced manufacturing technology	3	-	-	3
3	A2PDT2XX	Program Elective-I	3	-	-	3
4	A2PDT2XX	Program Elective-II	3	-	-	3
5	A2PDL101	CAD Laboratory	-		3	2
6	A2PDL102	CNC and Robotics Laboratory	-		3	2
7	A2PDT105	Research methodology and IPR	2	-	-	2
8	A2ACA50_	Audit course - I	2	-		0
		Total Number of Credits				**18**

SEMESTER - II						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2PDT103	Design for manufacture and assembly	3	-	-	3
2	A2PDT104	Finite Element Methods	3	-	-	3
3	A2PDT2XX	Program Elective-III	3	-	-	3
4	A2PDT2XX	Program Elective-IV	3	-	-	3
5	A2PDL103	Advanced Manufacturing Laboratory	-		3	2
6	A2PDL104	CAE Laboratory	-		3	2
7	A2ACA50_	Audit course - II	2	-	-	0
8	A2PDP401	Mini-Project	-	-	4	2
		Total Number of Credits				**18**

SEMESTER - III						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2PDT2XX	Program Elective-V	3	-	-	3
2	A2OET3XX	Open Elective	3	-	-	3
3	A2PDP402	Project Phase -I	-	-	20	10
		Total Number of Credits				**16**

SEMESTER - IV						
S.No	Course Code	Course Title	L	T	P	Credits
1	A2PDP403	Project Phase -II	-	-	32	16
		Total Number of Credits				**16**

Program Elective-I		
S.No	Course Code	Course Title
1	A2PDT201	Project management
2	A2PDT202	Quality and reliability engineering
3	A2PDT203	Industrial design and ergonomics

Program Elective-II		
S.No	Course Code	Course Title
1	A2PDT204	Mechotronics and Robotics
2	A2PDT205	Lean & Agile Manufacturing
3	A2PDT206	Flexible Manufacturing Systems

Program Elective-III		
S.No	Course Code	Course Title
1	A2PDT207	Advanced machine design
2	A2PDT208	Mechanical vibrations
3	A2PDT209	Advanced Metallurgy

Program Elective-IV		
S.No	Course Code	Course Title
1	A2PDT210	Surface Processing Techniques
2	A2PDT211	Product Life Management
3	A2PDT212	Non-traditional machining processes

Program Elective-V		
S.No	Course Code	Course Title
1	A2PDT213	Materials & Processes Selection
2	A2PDT214	Digital Manufacturing
3	A2PDT215	Six Sigma

Open Electives		
S.No	Course Code	Course Title
1	A2OET301	Business Analytics
2	A2OET302	Composite Materials
3	A2OET303	Cost Management of Engineering Projects
4	A2OET304	Industrial Safety
5	A2OET305	Operations Research
6	A2OET306	Waste to Energy

Audit Courses

1	A2ACA501	Constitution of India
2	A2ACA502	Disaster Management
3	A2ACA503	English for Research Paper Writing
4	A2ACA504	Pedagogy Studies
5	A2ACA505	Personality Development through Life Enlightenment Skills
6	A2ACA506	Sanskrit for Technical Knowledge
7	A2ACA507	Stress Management by Yoga
8	A2ACA508	Value Education

	SEMESTER – I	L	T	P	C
A2PDT101	PRODUCT DESIGN	3	-	-	3
	Total number of hours – 45				

SYLLABUS

UNIT-I

Introduction: Types of design, importance of design, design considerations, product life cycle, technology life cycle, benchmarking and mass customization, stages, objectives, success factors, concurrent approach in new product design (NPD)

UNIT-II

Product Development Process & Methodologies: Integrated Product development process - Identifying Customer Needs**:** Gather raw data from customers, interpret raw data in terms of customer needs, organize the needs into a hierarchy, establish the relative importance of the needs and reflect on the results and the process, Conceive – Specification, Concept design: the activities of concept generation, Concept Selection**:** Overview of methodology, concept screening, and concept scoring,

UNIT-III

Factors in product Design : Detailed design, Validation and analysis (simulation), Tool design, Realize - Plan manufacturing: Factors influencing material and process selection, approaches, tools and software used in selection, Manufacture, Build/Assemble, Test (quality check), Service - Sell and Deliver, Use, Maintain and Support, Dispose

UNIT-IV

Product Development Approaches: Bottom-up design, Top-down design, Front-loading design workflow, Design in context, Modular design. Concurrent engineering, partnership with supplier, collaborative and Internet based design, work structuring and team deployment, Product and process systemization, problem, identification and solving methodologies, improving product development solutions

UNIT-V

Prototyping: Prototyping basics, principles of prototyping, technologies, planning for prototypes, practical examples

Case Studies: Select case studies from automotive, aerospace, communication, etc. sectors

TEXT BOOKS:

1. **Dieter George E.**, Engineering Design, McGraw Hill Pub. Company, 2000.
2. **Ulrich Karl T and Eppinger Steven D.**, Product design and development, McGraw Hill Pub. Company, 1995.

REFERENCE BOOKS:

1. **Michael French**, Conceptual Design for Engineers, Springer
2. **NP Suh,** The Principles of Design, Oxford
3. **Chitale A. K. and Gupta R. C.**, Product Design and Manufacture, Prentice-Hall of India, New Delhi

COURSE OUTCOMES:

At the end of the course the student will be able to

CO1. Use the product life cycle and technology life cycle in development of new product

CO.2 Use the Product Design, as a means to manage the development of an idea from concept through to production

CO.3 Apply creative process techniques in synthesizing information, problem-solving and critical thinking.

CO.4 Select an appropriate product development approaches

CO.5 Know the principles, planning, technologies, types of rapid proto typing.

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PDT102	SEMESTER - I	L	T	P	C
	ADVANCED MANUFACTURING TECHNOLOGY	3	-	-	3
	Total Contact Hours – 45				

SYLLABUS

UNIT-I

Casting: Fundamentals of casting, shell molding, expendable pattern, plaster mold casting, ceramic mold casting, slush casting, squeeze casting, casting techniques for single crystal components, rapid solidification, continuous casting, vacuum casting, casting defects and remedies, economics of casting,

UNIT-II

Welding: Introduction, Welding Metallurgy, Methods of welding, physics of welding, plasma arc Welding, Electron Beam Welding, Laser Beam Welding, high frequency welding, ultrasonic Welding, Under water Welding, Friction stir welding. MIG & TIG Welding of stainless steels, Welding of cast iron, Welding of plastics, Weld design and process selection, welding safety, welds and their defects, inspection and cost estimating.

UNIT-III

Sheet Metal Forming Processes: Introduction sheet- Metal Characteristics, Test Methods for formability of sheet metals, superplastic forming, stretch forming, explosive, Magnetic-pulse, peen and other forming processes, equipment for sheet metal forming, The manufacture of honey comb structures, dent resistance of sheet metal parts, the economics of sheet metal parts and forming processes.

UNIT-IV

Micro machining: Introduction, Chemical machining, Electro chemical Grinding / electro grinding for tools a cutters, electro chemical deburring, laser beam machining applications, Electron Beam machining, Hot Machining, Electrode discharge machining, Ultrasonic machining, Abrasive jet machining, process capabilities of Unconventional Machining, determination of Material Removal Rate. The economics of advanced machining processes Precision manufacturing

UNIT-V

Processing of powder metals, ceramics glass and super conductors. Introduction, production of powders ,Sintering, Secondary a finishing operations, Process capabilities, economics of P/M, shaping ceramics, forming shaping of glass, design considerations for ceramics and glasses, processing of super conductors.

TEXT BOOKS:

1. K.C. Jain , A.K. Chitale -Text book of Production Engineering, PHI
2. Schmid, Kalpakjian-Manufacturing processes for Engineering materials, Pearson India.
3. Mukherjee P.C.-Fundamentals of Metal casting Oxford - IBH,1979.
4. Lancaster J.F.-Metallurgy of Welding - George Allen & Unwin Publishers,1980.

REFERENCE BOOKS:

1. Titoun.D & Stepanov .YU.A- Foundry Practice, MIR Publishers, Moscow, 1981.
2. Cornu. J. - Advanced Welding systems -Volumes me, II and III, JAICO Publishers, 1994.

COURSE OUTCOMES:

After completion of this course, the student will be able to

CO1. Select suitable casting technique for given component to be manufactured.

CO2. Classify various types of welding techniques, understand the requirements of sound weld and select suitable joining technique for given pieces for welding.

CO3. Understand the importance of sheet metal operations and economics of sheet metal parts and forming processes.

CO4. Understand the need of micromachining and steps involved in it.

CO5: Understand the significance of powder metallurgy as unique methods for manufacturing composites and ceramics.

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
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A2PDT201	SEMESTER – I (Program Elective-I)	L	T	P	C
	PROJECT MANAGEMENT	**3**	**-**	**-**	**3**
	Total Contact Hours – 45				

SYLLABUS

UNIT-I

INTRODUCTION TO PROJECT:

Concept of a Project – Meaning, classification, Characteristic features – Project considerations, Project Management – tools and techniques for project management – role of project Managers, Projects in Contemporary Organization

Project Initiation: Strategic Management, Project Selection &Evaluation- organization and project considerations, Risk Management, Portfolio Process- project portfolio management system

UNIT-II

Project Organization:

Organizational concepts in PM, Project feasibility studies, project life cycle, project constraints,

Project Planning: Systems integration, WBS & Responsibility Charts, Interface Coordination, Conflict and Negotiation in PM

UNIT-III

Project evaluation under certainty: Net Present Value, Benefit cost ratio, internal rate of return, payback period, urgency, accounting rate of return, Estimating Project Budgets, Improving Cost Estimation Process

Project evaluation under uncertainty: Methodology, commercial vs. National profitability, commercial or national profitability, social profitability

UNIT-IV

Information Needs & Reporting Process, Earned Value Analysis, Computerized PMIS, Project Control process: Need for Project Control, control issues, Types, Design of ControlSystems,ControlofCreativeActivities,Monitoring&InformationSystem,Planning-Monitoring- Controlling

Project Implementation: Scheduling: Background, Network Techniques: PERT & CPM, Risk Analysis, Resource Allocation: Crashing a Project, Resource Allocation, Resource Loading & Levelling, Constrained Resource Scheduling, Multi- project Scheduling &Resource Allocation, Goldratt's Critical Chain

UNIT-V

Project Termination: Project Auditing: System Goals &Project Audit, Audit Report, Project Audit Life Cycle, Project Termination, Varieties of Project Termination, Termination Process, Final Report, Project Completion, Review and Future Directions, introduction to software project management

TEXT BOOKS:

1. Clifford F. Gray and Erik W. Larson, Project management – The Managerial Process (Tata McGraw Hill), 2014
2. Prasanna Chandra, "Project Planning, Analysis, Selection, Implementation and review", Tata McGraw Hill ,2009
3. P. Gopalakrishnan and V. E. Rama Moorthy, Project Management, Macmillan India Ltd., New Delhi
4. Harold R. Kerzner, Project Management: A Systems Approach to Planning, Scheduling, and Controlling 10th Edition, 2012
5. Moder, J., C. Phillips and E. Davis, "Project Management with CPM, PERT and Precedence Diagramming", Van Nostrand Reinhold Company, Third Edition, 2003.

REFERENCE BOOKS:

1. A Guide to the Project Management Body of Knowledge (PMBOK® Guide) — Fifth Edition
2. "United Nations Industrial Development Organization (UNIDO) Manual for the preparation of Industrial Feasibility Studies", (IDSI Reproduction) Bombay, 2007
3. B. B. Goel, Project Management: Principles and Techniques, Deep & Deep Publications, New Delhi, 2009
4. Choudhury, S "Project Management", Tata McGraw-Hill Publishing Company, New Delhi 2008.

COURSE OUTCOMES:

After completion of this course, the student will be able to

CO1. Manage the selection and initiation of individual projects and their portfolios

CO2. Apply skills immediately to the efficiency of the business operation

CO3. Develop a project scope considering factors like customer requirements and Internal/ External goals

CO4. Describe a project life cycle and can skillfully map each stage of the cycle

CO5 Able to demonstrate effective project execution and control techniques for successful projects

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PDT202	**SEMESTER – I** (Program Elective-I)	**L**	**T**	**P**	**C**
	QUALITY AND RELIABILITY ENGINEERING	**3**	**-**	**-**	**3**
	Total Contact Hours – 45				

SYLLABUS

UNIT-I

Basic Concepts: Definitions of quality and Reliability, Parameters and Characteristics, Quality control, Statistical quality control, Reliability concepts.

UNIT-II

Concepts in Probability and Statistics : Events, Sample Space, Probability rules, Conditional probability, Dependent and Independent Events, Application of Probability concepts in Quality Control, Problems

Introduction to Probability Distributions: Normal, Poisson and Binomial distribution.

UNIT-III

Control Charts: Variable Chart – X Bar chart, R-chart and Sigma chart. Attribute Chart: P – Chart, n P Chart, C-Chart and U – Chart.

Acceptance Sampling: Fundamentals of acceptance sampling, types of acceptance sampling, O.C Curve, AQL, LTPD, AOQL.

UNIT-IV

Failure Data Analysis : Introduction, Failure Data, Quantitative measures, MTTF, MTBF, Bathtub Curve, Mean Life, Life Testing, Problems, Introduction to Failure Mode and Effect Analysis.

System Reliability: Series, parallel and mixed configuration, Block diagram concept, r- out-of-n structure solving problems using mathematical models.

UNIT-V

Reliability Improvement and Allocation : Difficulty in achieving reliability, Methods for improving reliability during design, Different techniques available to improve reliability, Optimization, Reliability-Cost trade off, Prediction and Analysis, Problems.

Maintainability and Availability: Introduction, Formulas, Techniques available to improve maintainability and availability trade-off among reliability, maintainability and availability, Simple problems

TEXT BOOKS:

1. **Quality Planning and Analysis -** Tata McGraw - Juran, J.M and Gryna, F.M. - Hill publishing Coimpany Ltd., New Delhi, India – 1982.
2. **Maintainability and Reliability Handbook of Reliability Engineering and Management -** Editors –Ireson. W.G. and Cooms - C.F. McGraw - Hill Book Company Inc. – 1988.
3. **Concepts in Reliability Engineering-** Srinath L S - Affiliated East-West Press Private Limited, New Delhi, India. – 1985.

REFERENCE BOOKS:

1. **An Introduction to Reliability and Maintainability Engineering** - TMH Charles Ebeling - Tata McgrawHill – 2000.
2. **Reliability Engineering** - A K Govil - Prentice Hall – 1981.

COURSE OUTCOMES:

After completion of this course, the student will be able to

CO1. Understand the fundamental concept of quality and reliability and their interdependence.

CO2.Classify various terms involved in probability statistics and categories different types of probability distributions.

CO3. Analyze the importance of different control charts and concept of acceptance sampling.

CO4. Understand the steps involved in failure analysis and reliability system.

CO5: Illustrate difficulties in achieving reliability and apply Techniques available to improve maintainability and availability trade-off among reliability.

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PDT203	**SEMESTER – I** (Program Elective-I)	**L**	**T**	**P**	**C**
	INDUSTRIAL DESIGN AND ERGONOMICS	**3**	**-**	**-**	**3**
	Total Contact Hours – 45				

SYLLABUS

UNIT-I

Introduction: An approach to industrial design -elements of design structure for industrial design in engineering application in modern manufacturing systems.

UNIT-II

Ergonomics and Industrial Design: Introduction -general approach to the man- machine relationship- workstation design-working position.

Control and Displays: Shapes and sizes of various controls and displays-multiple, displays and control situations -design of major controls in automobiles, machine tools etc., and design of furniture -redesign of instruments.

UNIT-III

Ergonomics and Production: ergonomics and product design -ergonomics in automated systems- expert systems for ergonomic design. Anthropometric data and its applications in ergonomic, design- limitations of anthropometric data-use of computerized database. Case study.

UNIT-IV

Visual Effects of Line and Form: The mechanics of seeing- psychology of seeing general influences of line and form.

Colour: Colour and light -colour and objects- colour and the eye -colour consistency- colour terms- reactions to colour and colour continuation -colour on engineering equipments.

UNIT-V

Aesthetic Concepts: Concept of unity- concept of order with variety -concept of purpose style and environment-Aesthetic expressions. Style-components of style- house style, observation style in capital goods, case study.

Industrial Design in Practice: General design -specifying design equipment's- rating the importance of industrial design -industrial design in the design process.

TEXT BOOKS:

1. **Industrial Design for Engineers -** MayallW.H. - London Hiffee books Ltd. -1988.
2. **Applied Ergonomics Hand Book -** Brain Shakel (Edited) - Butterworth scientific. London -1988.

REFERENCE BOOKS:

1. **Introduction to Ergonomics -** R. C. Bridger - McGraw Hill Publications - 1995.
2. **Human Factor Engineering** - Sanders & McCormick - McGraw Hill Publications – 6thedition, 2002.

COURSE OUTCOMES:

After completion of this course, the student will be able to

CO1. Understand the primary elements in designing of modern manufacturing systems.

CO2. Design work station and controls in automobiles, machine tools based on ergonomics.

CO3. Interpret the importance of ergonomics in automated systems.

CO4. Understand the influence of color and light on visualization of line and form.

CO5: Recognize the need of aesthetic and rating of industrial design.

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PDT204	SEMESTER – I (Program Elective-II)	L	T	P	C
	MECHATRONICS AND ROBOTICS	**3**	**-**	**-**	**3**
	Total Contact Hours – 45				

SYLLABUS

UNIT-I

Mechatronics: Introduction to Mechatronic system, evolution, scope and components of Mechatronics systems, Mechatronics in product and measurement system, control system and modes of control, traditional design and Mechatronic design, Introduction to Sensors, Signal conditioning and Actuators

UNIT-II

Programmable Logic Controller: Review of logic gates, basic structure, features, input/output processing, programming, functional block diagram(FBD), ladder diagram, logic functions, latching, sequencing, jumps, internal relays, counters, shift registers, master and jump control, data handling, data movement, data comparison, arithmetic operations, code conversion, analog input and output

UNIT-III

Microcontrollers: Comparison between microprocessor and microcontroller, organization of micro controller system, architecture of MCS51 controller, pin diagram of 8051, addressingmodes,programmingof8051, interfacing input and output devices, interfacing D/A converters and A/D converters,

Real-Time Interfacing: Introduction, Elements of Data Acquisition and Control System, Overview of I/O Process, Installation of the I/O Card and Software, Installation of the application, Software, Examples, Over framing

UNIT-IV

Robotics: Robot Definition, Classification of Robots, Robot System components, Functions of Robot System, Specification of Robot System, Robot Drives and Power transmission systems, Remote Centered Compliance devices. Robotic Sensory Devices, Non optical Position sensors, Optical position sensors, Velocity sensors, Accelerometers, Proximity sensors, Touch and Slip Sensors, Force and Torque sensors–Robot vision system

UNIT-V

Robot cell layouts–multiple Robots and machine interface, consideration in work cell design, interlocks, error detection and recovery, Robot cycle time analysis, simulation of Robot work cells.

Applications of robots in material transfer, machine loading and unloading, welding, assembly and inspection, safety, training, maintenance and quality aspects, Economics and social aspects of robotics

TEXT BOOKS:

1. **W.Bolton**, Mechatronics, Pearson Education
2. **RichardD.Klafter**, **ThomasA. Chmie lewski and Michael Negin**, Robotic Engineering–An Integrated Approach, Prentice Hall of India Pvt Ltd, 2002

REFERENCE BOOKS:

1. **DevdasShetty, RichardA.Kolk**, Mechatronics System Design, Thomson
2. **ShimonY.Nof,** Hand Book of Robotics, John Wileysons, 1985.

COURSE OUTCOMES:

Students will be able

CO1: List out components in mechatronics systems and conceptual understanding of sensors, Signal conditioning and actuators.

CO2: To discuss different elements in Programmable Logic Controller and their function.

CO3: Differentiate between microprocessor and microcontroller and deal with real time interfacing.

CO4: Describe the components, classification and functions of robot and key features of robot vision system.

CO5: Design work cell and select robots for applications

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PDT205	**SEMESTER – I** (Program Elective-II)	**L**	**T**	**P**	**C**
	LEAN & AGILE MANUFACTURING	**3**	**-**	**-**	**3**
	Total Contact Hours – 45				

SYLLABUS

UNIT-I

Just In Time Production System: JIT Logic -Pull system, Japanese approach to production elimination of waste, JIT implementation requirements, JIT application for job shops

UNIT-II

Kanban System: Kanban rules supplier Kanban and sequence schedule used by supplier, Monthly information &daily information, later replenish system by Kanban sequenced withdrawal system by sequence schedule table-problems& counter measures in applying Kanban system to sub contractors- Supplier Kanban circulation in the paternal manufacturer-structure of supplier Kanban sorting office.

UNIT-III

The Rise & Fall of Mass Production: Mass production, workforce, organization, tools, product–logical limits of mass production, Sloan as a necessary compliment to Ford

The Rise of Lean Production: Birthplace, concrete example, company as community, Final assembly plant, product development and engineering .Changing customer demand, dealing with the customer, future of lean production.

UNIT-IV

Shortening of Production Lead Times: Reduction of set up times, practical procedures for reducing setup time. Standardization of operations, Machine layout, multifunction workers and job rotation, Improvement activities to reduce work force and increase worker morale, foundation for improvements.

UNIT-V

Elements of Lean Production

Managing Lean Enterprise: Finance, Career ladders, geographic spread and advantages of global enterprise.

An action plan: Getting started, creating an organization to channel your streams, install business system to encourage lean thinking, the inevitable results of5-year commitment.

TEXT BOOKS:

1. **Chasel Aquilino**," Productions and Operations Management", TMH
2. **Yasuhiro Monden**, " Toyoto Production System -An integrated approach to Just in Time", Engineering and ManagementPress, Institute ofIndustrialEngineers, NorcrossGeorgia.
3. **James PWomack, DanielTJones, and Daniel Roos**, " The Machine that changed the World. The Story of Lean Production", Harper Perennial edition, 1991.
4. **JamesWomack and Daniel T Jones**, "LeanThinking", Simon & Schuster UK.

REFERENCE BOOKS:

1. **Richard Schour berger**, "Japanese Manufacturing Techniques. The NineHidden Lessons bysimplicity".
2. **JamesBossert**,"QualityFunctionDevelopment",ASQCPress1991.
3. **Launshy and Weese** ," Straight talk on design of experiments".

COURSE OUTCOMES:

After completion of this course, the student will be able to

CO1.Understand the steps involved in eliminating production waste and requisites for JIT implementation.

CO2.Gain thorough knowledge in Kanban system.

CO3. Have the idea about nature of mass production in context of time and concept of evolution of lean manufacturing.

CO4. Understand the methodology in reducing lead time.

CO5: Understand the elements in lean manufacturing and install business system to encourage lean thinking.

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PDT206	SEMESTER – II (Program Elective-II)	L	T	P	C
	FLEXIBLE MANUFACTURING SYSTEMS	**3**	**-**	**-**	**3**
	Total Contact Hours – 45				

SYLLABUS

UNIT–I

FMS-An overview Definition of FMS- Types and configurations concepts – types of flexibility and performance measures. Function of FMS host computer – FMS host and area controller function distribution, Development and implementation of an FMS: Planning phase – integration – system configuration – FMS layouts – Simulation – FMS project development steps. Project management – equipment development – host system development – planning – hardware and software development.

UNIT–II

Automated material handling and storage Functions – types – analysis of material handling equipment's, design of conveyor and AGV systems, Problems, Automated storages: Storage system performance, AS/RS Carousel storage system. WIP storage system interfacing handling storage with manufacturing.

UNIT–III

Modelling and analysis of FMS: Analytical, heuristics, queuing simulation and petrinet modelling techniques-scope applicability and limitations. Concepts of distributed numerical control DNC system – communication between DNC computer & machine control unit – Hierarchical processing of date in DNC system – Features of DNC systems.

UNIT–IV

Scheduling and loading of FMS: Introduction – Scheduling of operations on a single machine – 2 machine flow shop scheduling – 2 machine job shop scheduling, 3 machine flow shop scheduling – scheduling 'n' operations on 'm' machines loading problems. Scheduling rules

UNIT–V

Tool management of FMS – material handling system schedule. Problems, Inspection and cleaning stations. CMM, sequence of operations, advantages types of CMM problems. FMS relational: Economic and technological justification for FMS – as GT, JIT – operation and evaluation – personnel and infrastructural aspects – typical case studies – future prospects.

TEXT BOOKS:

1. Parrish D J, Flexible manufacturing, Butterworth – Heinemann, Ltd Oxford, 1993
2. Groover M P, Automation, production system and computer integrated manufacturing, PHI, 1989

REFERENCE BOOKS:

1. Vishwanatham N and Narahari Y, peroformance modeling of automated manufacturing Systems, PHI, 1992
2. Ranky P G, The design and operation of FMS, IFS publication, UK, 1988
3. Dr. H K Shivanand, "Flexible Manufacturing System" – Dhanpat Rai Publication, New Delhi.

COURSE OUTCOMES:

After completion of this course, the student will be able to

CO1. Select, Develop and implement Flexible Manufacturing system

CO2. Analyze and design material handling and storage systems

CO3. Select suitable modelling and control techniques

CO4. Solve Scheduling problems occur in FMS systems

CO5: Utilize different management techniques for FMS systems

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
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A2PDT105	SEMESTER – I	L	T	P	C
	RESEARCH METHODOLOGY AND IPR	2	-	-	2
	Total number of hours – 30				

SYLLABUS

UNIT-I

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem.

Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT-II

Effective literature studies approaches, analysis, Plagiarism, Research ethics,

Effective technical writing, how to write report, Paper

Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT-III

Nature of Intellectual Property: Patents, Designs, Trade and Copyright.

Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT-IV

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT-V

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc.

Traditional knowledge Case Studies, IPR and IITs.

TEXT BOOKS:

1. Stuart Melville and Wayne Goddard, “Research methodology: an introduction for science & engineering students’”
2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”

REFERENCE BOOKS:

1. Ranjit Kumar, 2nd Edition, “Research Methodology: A Step by Step Guide for beginners”
2. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd ,2007.
3. Mayall, “Industrial Design”, McGraw Hill, 1992.
4. Niebel, “Product Design”, McGraw Hill, 1974.
5. Asimov, “Introduction to Design”, Prentice Hall, 1962.
6. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “ Intellectual Property in New Technological Age”, 2016.
7. T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008

COURSE OUTCOMES:

At the end of the course the student will be able to

CO1. Identify sources and characteristics of a good research problem

CO.2 prepare or develop a research proposal/ technical paper

CO.3 know the procedure for grant of patents.

CO.4 understand the patent rights, licensing and transfer of technology

CO.5 know new developments in IPR

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Council, 13-07-2019.

A2PDL101	SEMESTER - I	L	T	P	C
	CAD LABORATORY	-	-	3	2
	Total Contact Hours – 45				

SYLLABUS

Introduction to Modeling packages - ProEngineer, Ideas, CATIA, Uni Graphics, Solid Works.

Drafting

1. Simple 2D-drawing using sketcher options
2. Complex 2D-drawing using sketcher options
3. Application Oriented 2D-drawing using sketcher options

Modeling

4. Simple 3D-Assembly parts using form features
5. Complex 3D-drawing using form features

Assembly

6. Flange Coupling
7. Knuckle Joint
8. Oldham Coupling

Sheet Metal

9. Creating simple sheet metal models
10. Creating complex sheet metal models

REFERENCE BOOKS:

1. CATIA V5R14 for Designers by Sham Tickoo
2. Creo Parametric 2.0 by Louis Gary Lamit

COURSE OUTCOMES: At the end of the course the student will be able to

CO.1 Present an overview of CAD and describe its applications in different fields

CO.2 Describe common terms associated with CAD hardware and software.

CO.3 Give outline of basic principles associated with CAD and to demonstrate common drafting and modeling techniques used by professionals.

CO.4 Introduce the advanced capabilities of CAD and how they can be used to increase productivity

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
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	Semester I	L	T	P	C
A2PDL102	**CNC AND ROBOTICS LABORATORY**	-	-	3	2
	Total Contact Hours – 45				

Student will be introduced to the different types of sensor, microprocessor boards, programmable logic control (PLC) units and motion control systems.

Student will design and demonstrate working of different kinds of mechatronic systems over the course of the semester involving one or more of the above.

LIST OF EXPERIMENTS

The following activities will have to be carried out:

1. Calibration of sensors
2. Interface of sensors and data acquisition for any practical requirement – force, strain, speed, vibration, temperature, orientation/angle, distance, pressure etc.
3. Integration and analysis of data using Lab View and/or MAT Lab
4. Interfacing sensors with microprocessor and programming for execution of task
5. Interfacing mechatronic subsystems and programming using PLC
6. Operation and programming of 6-axis robot for pick and place
7. Programming of robot for collision avoidance and path planning
8. Basic control operations of a CNC machine – Referencing, Jog, MDI, Auto mode operations, Trouble shooting and electrical system analysis of a CNC machine
9. Tool setting and offset compensation
10. Part programming onto the CNC machine for a job requirement
11. Generating part program from a CAD model
12. Download and machining of component using the above part program
13. Web based manufacturing

Note: Any 10 activities from the above need to be completed during the course of the semester

COURSE OUTCOMES

Student will be able to

CO. 1 Calibrate sensors, acquire data; analyze using software & integrate.

CO. 2 Interface sensors with microprocessors and Mechatronics subsystems using PLC.

CO. 3 Program & operate 6 axis robo arm

CO. 4 Troubleshoot, operate CNC right starting from CAD part programming.

Course designed by	DEPARTMENT OF MECHANICAL ENGINEERING
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M.Tech(VLSI)

MAHARAJ VIJAYARAM GAPATHI RAJ COLLEGE OF ENGINEERING(AUTONOMOUS)
Vijayaram Nagar Campus, Chintalavalasa, Vizianagaram-535005, Andhra Pradesh
Accredited by NAAC with 'A' Grade & Listed u/s 2(f) & 12(B) of UGC
(Approved by AICTE, New Delhi and Permanently Affiliated by JNTUK-Kakinada)
NBA Accredited UG Courses: B.Tech(MEC), B.Tech(CIV), B.Tech(EEE), B.Tech(ECE), B.Tech(CSE), B.Tech(IT), B.Tech(MEC) & B.Tech(CHE) and PG Course: MBA

ACADEMIC REGULATIONS & CURRICULUM

M.Tech. (VLSI)

Applicable to the students admitted from the Academic year 2019-2020

MAHARAJ VIJAYARAM GAJAPATHI RAJ COLLEGE OF ENGINEERING

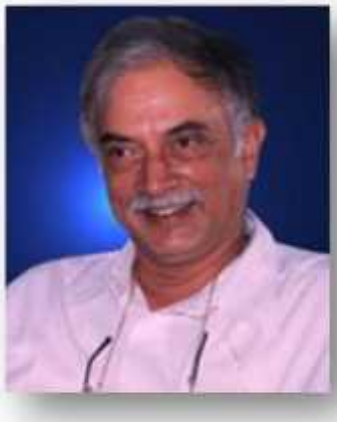
(Autonomous)

(Approved by AICTE, New Delhi, and permanently affiliated to JNTUK, Kakinada)
Re-Accredited by NBA, Re-accredidated by NAAC with 'A' Grade,
Listed u/s 2(f) & 12(B) of UGC Act 1956.
Vijayaram Nagar Campus, Chintalavalasa,
Vizianagaram-535005, Andhra Pradesh

The visionaries

Late Dr. P V G Raju
Raja Saheb of Vizianagaram
Founder Chairman-MANSAS
Ex-Minister for Education and Health, Govt. of AP
Ex Member of Parliament

Late Dr. P. Anand Gajapathi Raju
Ex-Chairman-MANSAS
Ex-Minister for Education and Health
Govt. of AP
Ex Member of Parliament



P. Ashok Gajapathi Raju
Chairman-MANSAS
Ex-Union Minister for Civil Aviation,
Govt. of India
Ex-Minister for Finance, Govt. of AP

Vision

Maharaj Vijayaram Gajapathi Raj College of Engineering strives to become a centre par excellence for technical education where aspiring students can be transformed into skilled and well-rounded professionals with strong understanding of fundamentals, a flair for responsible innovation in engineering practical solutions applying the fundamentals, and confidence and poise to meet the challenges in their chosen professional spheres.

Mission

The management believes imparting quality education in an atmosphere that motivates learning as a social obligation which we owe to the students, their parents/guardians and society at large and hence the effort is to leave no stone unturned in providing the same with all sincerity. Towards that end, the management believes special focus has to be on the following areas:

M1: Have on-board staff with high quality experience and continuously updating themselves with latest research developments and sharing that knowledge with students.

M2: Having a well stream-lined teaching learning process that is continuously assessed for effectiveness and fine-tuned for improvement.

M3: Having state-of-the-art lab and general infrastructure that gives students the necessary tools and means to enhance their knowledge and understanding.

M4: Having a centralized department focused on improving placement opportunities for our students directly on campus and coordinating the training programs for students to Complement the curriculum and enhance their career opportunities.

M5: Having advanced research facilities and more importantly atmosphere to encourage students to pursue self-learning on advanced topics and conduct research.

ABOUT THE INSTITUTION:

Maharajah Alak Narayan Society of Arts and Science (MANSAS) is an Educational Trust founded by Dr. (late) P.V.G Raju, Raja Saheb of Vizianagaram in the hallowed memory of his father Maharajah Alak Narayan Gajapati with a view to confound socio-economic inequalities in the Vizianagaram principality executing a trust deed on 12-11-1958 duly established Maharajah's College and other educational institutions in and around Vizianagaram. The Trust is a charitable one published under Section 6 a (1) of A.P Charitable and Hindu Religious Institutions and Endowment Act 30 of 1987.

The object of the Trust is to manage the properties of educational institutions under it and to promote and advance the cause of education in general, besides awarding scholarships to deserving students enabling them to undergo special training in science and industries in and out of India. The Trust has made an uncompromising contribution to the nation by presenting the stalwarts.

Trust offers KG to PhD level education in Arts, Sciences, Law, Pharmacy, Humanities Education, Engineering and Management and presently houses 13 Educational Institutions. MVGR College of Engineering is one of the 13 Institutes.

Other Institutions under MANSAS

1. M.R. HIGH SCHOOL 1857
2. M.R COLLEGE **(NAAC ACCREDITED)** 1879
3. M.R. COLLEGE OF EDUCATION 1950
4. M.R. WOMENS COLLEGE **(NAAC ACCREDITED)** 1962
5. M.R. GIRLS HIGH SCHOOL 1974
6. M.R. MODEL HIGH SCHOOL 1974
7. M.R. ENGLISH MEDIUM SCHOOL 1979
8. M.R.V.R.G.R LAW COLLEGE 1987
9. M.R. P.G. COLLEGE **(NAAC ACCREDITED)** 1987
10. M.R.SCHOOL OF MANAGEMENT STUDIES 1994
11. M.R.V.R.G.R – II MEMORIAL JR. COLLEGE 1994
12. M.R. COLLEGE OF PHARMACY 2004

Maharaj Vijayaram Gajapathi Raj (MVGR) College of Engineering was established in the year 1997 by Maharaj Alak Narayan Society for Arts and Sciences (MANSAS) to impart quality technical education. The Institution is located in lush green, serene and pollution free environment spread over 60 acres of land in Chintalavalasa village situated in the outskirts of Vizianagaram, a fort city in the north coastal region of Andhra Pradesh.

Institution at a glance:

- MVGR is a 22 years old institution, established in 1997
- All eligible UG Programs (CHEMICAL, CIVIL, CSE, ECE, EEE, IT & MECHANICAL) were re-accredited by NBA.
- MBA program was also re-accredited by NBA.
- Had been re-accredited with Grade ‘A’ by NAAC of UGC
- Has Permanent affiliation with JN Technological University-Kakinada
- Listed under sections 2(f) & 12(b) of UGC act 1956.
- Approved by AICTE-New Delhi
- EIGHT departments are recognized as RESEARCH CENTERS by JNTU-K
- Granted Autonomy by UGC in 2015
- Campus of 60 acre

- Offering 7 UG and 5 M.Tech and MBA program
- About 250 faculty of which 84 Ph.D. Degree holders
- 83 Laboratories with an investment of about 13 crores
- Total built up area of about 7 Lakh sft
- About 42,000 volumes and Access to 8 international online journal packages like IEEE, SPRINGER, etc.
- 1420 Systems & 395 Mbps band width internet facility
- About Rs. 4 crore worth of on-going R&D projects
- Actively involved in civil engineering consultancy work as Third Party Quality Auditor for Vizianagaram Municipality
- WIPRO Recognized technology learning center and MISSION 10X partner institution
- Recognized National Instruments Academy for Training in LabView
- SIRO Recognition by DSIR
- Recognized PTC Centre of Excellence for Creo Training
- Identified by MSME as Business Incubation Centre
- APSSDC-Siemens Technical Skill Development Institute
- Recognized CMs SKILL EXCELLENCY CENTER (SEC)
- Micrsoft Ed-vantage Platinum Partner
- Institutional member of IUCEE
- Institutional Member of CII
- Member, Chamber of Commerce, Vizianagaram
- Green Campus award by Govt. of AP

MVGR College of Engineering is rated as one among the best engineering colleges in the state of Andhra Pradesh as it set up highest standards in all areas of curricular, co-curricular and extra-curricular activities and in students' placements. Based on industry and expert's feedback, the college is updating the curriculum from time to time. The college offers many value added add-on courses students and conducts training programs to meet the industries' requirements.

Academic Regulations for M.Tech. Program

Applicable to the students admitted from the Academic year 2019-20 onwards.

1. PROGRAM STRUCTURE:

M.TECH:

S.No	Category	Credits
1	Program core courses	16
2	Program Elective courses	19
3	Open Electives	3
4	Research Methodology and IPR	2
5	Mini Project with seminar	2
6	Dissertation / Industrial Project	26
7	Audit courses 2	0
	Total	68

Open Elective

1. Business Analytics
2. Composite Materials
3. Cost Management of Engineering Projects
4. Industrial Safety
5. Operations Research
6. Waste to Energy

Audit course 1 & 2

1. Constitution of India
2. Disaster Management
3. English for Research Paper Writing
4. Pedagogy Studies
5. Personality Development through Life Enlightenment Skills.
6. Sanskrit for Technical Knowledge
7. Stress Management by Yoga
8. Value Education

2. PROGRAM PATTERN:

The program is for 2 academic years - 4 semesters.

3. AWARD OF DEGREE:

A student will be declared eligible for the award of degree if he/she fulfills the following academic regulations.

- A student shall be declared eligible for the award of the degree, if he/she pursues a course of study for not less than two academic years and not more than four academic years.

- A student shall register for **68** credits and secure all **68** credits.
- Students who fail to complete Two Years Course of study within Four years shall forfeit their seat and their admission stand cancelled.

4. CERTIFICATION PROGRAMS:

S.No.	Dept	Name of the Program
1	MECH	Windchill 10.2 PDM by Adroitec Engineering Solutions Pvt. Ltd., Hyderabad
2	MECH	Creo 2.0 by PTC
3	MECH	Edgecam by Verosoft, UK
4	MECH	ANSYS Training and Certification by Mechanical Department
5	MECH	AUTOCAD Training and Certification by Mechanical Department
6	MECH	Catia by APSSDC-Dassault Systemes, CM's Center of Excellence
7	MECH	Delmia by APSSDC-Dassault Systemes, CM's Center of Excellence
8	MECH	Simulia by APSSDC-Dassault Systemes, CM's Center of Excellence
9	MECH	2-Wheeler Automobile Certification by APSSDC-SIEMENS
10	MECH	4-Wheeler Automobile Certification by APSSDC-SIEMENS
11	MECH	Welding Certification by APSSDC-SIEMENS
12	MECH	CNC Certification by APSSDC-SIEMENS
13	MECH	Commercial Electrical Certification by APSSDC-SIEMENS
14	MECH	Solid Edge Certification by APSSDC-SIEMENS
15	CHEM	Chemical Process Design and Simulation by Simtech Simulations, Hyderabad
16	ECE	Embedded Systems by ThinkLABS, Mumbai
17	ECE	Labview by National Instruments Systems India Pvt. Ltd.
18	ECE	Unified Technology Learning Program (UTLP) by Wipro Mission 10X
19	CSE, IT	PEGA by Virtusa Corporation
20	CSE, IT	Microsoft technologies by Microsoft Corp.
21	CSE, IT	Ethical Hacking by EC-Council Academia
22	CSE, IT	Java and C by Talent Sprint
23	CSE, IT	Network Analyst (CCNA) by Cisco Systems Inc
24	CSE, IT	Java Programming (OCJP) and DBMS by Oracle
25	EEE	PLC, Drives and Automation by Siemens
26	EEE	PLC by New Dawn Automation
27	EEE	Home Electrical Certification by APSSDC-SIEMENS
28	Civil	Remote Sensing and GIS by Indian Institute of Remote Sensing

a) The Institution shall offer the certification programs by itself or in collaboration with industry/such other Institutions deemed to have specialized expertise in the proposed area of training.

b) Only students of the Institution shall be eligible to register on payment of prescribed fee.

c) However, subject to availability of resources and the demand the Institution may offer the program to external candidates meeting the pre-qualification requirements and in the order of the merit.

d) The duration of the course and design of the content shall be done by the respective departments of the Institution by themselves or in collaboration with industry/such other institutions deemed to have specialized expertise in the proposed area of training.

e) If the duration of the course is less than or equal to 40 hours, it can be completed in one semester, otherwise, it can suitably distributed over a number of semesters.

f) Mere enrolment/registration for the program shall not entitle any claim for award of certificate.

g) A candidate shall be deemed eligible for the award of the certificate if he/she

- Attends at least 75% of scheduled training sessions
- Complies to all the requirements of submission of the assignments, presentations, seminars, projects, etc., and also appears for periodic tests.
- Shall attain minimum levels of performance in tests as prescribed.
- Shall remit such fee as deemed fit for the certification
- A candidate registered and failed to meet the requirements shall be permitted to repeat the said training one another time after remitting 25% of the fee fixed for the program as re-registration fee.

If the student is absent for the periodic tests, the test shall be re-conducted on payment of 10% of fee.

5. COURSES OFFERED:

Name of the Program	Degree
UG Programs (Engineering & Technology)	B.Tech (Civil) B.Tech.(EEE) B.Tech.(Mech.) B.Tech.(ECE) B.Tech.(CSE) B.Tech.(CHEM) B.Tech.(IT)
PG Programs (Engineering & Technology)	M.Tech.(Structural Engineering) M.Tech. (Power Systems) M.Tech.(PDM) M.Tech.(VLSI) M.Tech.(CN&IS)
Other PG Programs	MBA
Research Programs	Ph.D in Civil, EEE, MECH, ECE, CSE, CHEM, MBA and MATHS

6. DISTRIBUTION AND WEIGHTAGE OF MARKS:

All Theory courses will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment:

- **Subjective tests – 30 Marks**
- **Assignments - 10 Marks**
    - Two subjective tests shall be conducted each for 30 Marks.
    - Each subjective test shall be conducted for 90 Minutes and have 3 questions each for 10 marks (No choice).
    - Average of the two subjective tests shall be considered as performance in internals.
    - Assignments shall be assessed for 10 marks.

Semester End Assessment:

- Semester End examination is for 60 marks (180 min). Question paper contains 5 questions (one from each unit with internal choice). Each question carries 12 marks. A student shall answer all 5 questions.

a) LABORATORY/PRACTICE:

All Laboratory/Practice courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for Semester End Examination.

Internal assessment: (40 Marks)

- Continuous assessment: :20 Marks
- Internal test: :20 Marks

Semester End Assessment: (60 Marks)

- Semester End Examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Both internal and semester end examination shall include assessment of the student on
    - ❑ Knowledge of principles/concepts involved
    - ❑ Experimental design
    - ❑ Result interpretation and analysis
    - ❑ Experimental report

b) DRAWING/DESIGN/ESTIMATION:

These courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end examination.

- Continuous assessment for 20 marks for each unit finally averaged to 20 marks.
- Two internal assessment tests are conducted during the semester which shall be assessed for another 20 marks by taking the average.

c) Research Methodology & IPR shall be evaluated internally for 50 marks by PRC at the end of I semester

d) Mini Project with Seminar shall be evaluated internally for 50 marks by PRC in the II semester

e) For **audit course** a student is deemed to satisfy the minimum contact hours, as prescribed by the department and shall also comply with the requirements for submission of assignments/projects. A student shall also opt for MOOCs and submit the certificate after completion of the course.

f) PROJECT EVALUATION:

Duration is TWO semesters –Minimum of 40 weeks period is mandatory to submit.

- PRC includes HOD and two other senior faculties, one being the guide.
- To register for project work, a student shall complete all the course work requirements of I and II semesters.
- The progress of the work shall be periodically reviewed by PRC.
- The PRC shall authorize /approve change of guide/topic/title as deemed fit.
- A student shall submit Status Report in line with the recommended project calendar as approved by PRC.
- Student has to submit draft copy of thesis/dissertation to PRC, and also shall make an oral presentation. He/she shall publish the work in journal or international conference of repute and relevance.
- A student shall make 5 copies of PRC approved work and submit.
- Candidates who have successfully passed all theory and lab courses shall be eligible for submitting the thesis.
- The thesis shall be adjudicated by the internal & external examiners and Head of the department.
- Student shall be examined for his contributions, knowledge along with the quality of the work through presentations and Viva-voce.
- The assessment of work shall be done on the following lines:
  - **Project phase -I** which includes Problem definition, Literature survey, tool specific knowledge shall be evaluated internally for 100 marks by PRC at the end of III semester.

- **Project phase II** shall be evaluated for 300 marks at the end of IV semester. Out of 300 marks, 120 marks shall be evaluated internally by PRC and remaining 180 marks shall be evaluated externally by the internal and external examiner.

- The evaluation of Project phase II shall be made on the following aspects.
    - Experimental/methodology design
    - Result analysis and interpretations
    - Report writing
    - Presentation
    - Viva-voce

7. ATTENDANCE REGULATIONS:

- A student shall be eligible to appear for end semester examinations, if he or she acquires a minimum of 75% of attendance in aggregate of all the subjects (Theory & Lab.) for the semester.
- Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the college academic committee.
- Shortage of attendance below 65% in aggregate of all the subjects (Theory & Lab) for the semester shall not be condoned.
- Detained student shall seek re- admission for that semester when offered within 4 weeks from the date of commencement of class work.

8. MINIMUM ACADEMIC REQUIREMENTS:

- A student is deemed to have satisfied the minimum academic requirements for a course on securing at least 24 marks out of 60 marks at semester end examination and overall minimum of 50 marks out of 100 marks including internal assessment.

9. GRADING SYSTEM:

Semester Grade Point Average (SGPA) for the current semester which is calculated on the basis of grade points obtained in all courses, except audit courses and courses in which satisfactory or course continuation has been awarded,

$$SGPA = \Sigma \text{ (course credits earned x Grade points)} / \Sigma \text{ (Total course credits in the semester.}$$

CGPA= Σ (course credits earned x Grade points) up to successfully completed semesters / Σ (Total course credits up to successfully completed semesters)

The UGC recommends a 10-point grading system with the following letter grades as given below:

O	(Outstanding)	10
A+	(Excellent)	9
A	(Very Good)	8
B+	(Good)	7
B	(Above Average)	6
P	(Pass)	5
F	(Fail)	0
Ab	(Absent)	0

- iii. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X 10= 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			**139**

Thus, **SGPA** =139/20 = 6.95

Illustration for CGPA

Semester 1	**Semester 2**	**Semester 3**	**Semester 4**
Credit : 18	Credit : 18	Credit : 16	Credit : 16
SGPA:7.9	SGPA: 7.8	SGPA: 7.6	SGPA: 8.0

Thus, **CGPA** = 18 x 7.9 + 18 x 7.8 + 16 x 7.6 + 16 x 8.0

$$\frac{142.2+140.4+121.6+128}{} = \mathbf{7.83}$$

10. ELIGIBILITY FOR AWARD OF DEGREE:

M.Tech.:

A student shall be eligible for award of the degree if he/she fulfills the following conditions:

1) Successfully completes all the courses prescribed for the Program.
2) CGPA greater than or equal to 5.5(Minimum requirement for Pass),

11. AWARD OF CLASS:

Eligible candidates for the award of M.Tech. Degree shall be placed in one of the following Classes based on CGPA.

Class	CGPA
Distinction	≥ 7.5
First Class	≥ 6.5
Pass Class	≥ 5.5

12. INSTRUCTION DAYS

A semester shall have a minimum of 90 clear instruction days.

13. TRANSFERS FROM OTHER INSTITUTIONS SHALL NOT BE PERMITTED.

14. SUPPLEMENTARY EXAMINATIONS

Supplementary examinations shall be conducted along with regular examinations.

15. WITHHOLDING OF RESULTS

The result of a student shall be withheld

- If the student has not paid the dues, if any, to the institution.
- If any case of pending disciplinary action
- Involvement in any sort of malpractices etc.
- Involvement in ragging.

16. TRANSITORY REGULATIONS

A Candidate shall be readmitted from University regulations to A1 regulations or from A1 regulations to A2 regulations as per the guide lines of JNTUK.

17. AMENDMENTS TO REGULATIONS:

The Academic Council of MVGR College of Engineering (Autonomous) reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations, and/ or Syllabi or any other such matter relating to the requirements of the program which are compatible to the contemporary/emerging trends effectively meeting the needs of society/industry/stake holding groups.

18. Regulations for MALPRACTICES during the conduct of examinations

	Nature of Malpractices/Improper conduct	Punishment
1 (a)	If the candidate possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only. *
(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. *
2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled. *
3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an

		outsider/candidate not on rolls, he will be handed over to the police and a case is registered against him. *
4	If the candidate mishandles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. Also if the answer script is mutilated / damaged disturbing the shape, of the script, answers, the bar code intentionally.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. He shall be debarred from class work and all examinations and be allowed to reregistered for the next subsequent odd or even semester only. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.*
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	The same should be brought to the notice of CE who in turn in consultation with malpractice committee makes decision for cancellation of the performance in that subject. *
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. *
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and

		all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. *
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. *
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. *
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and

		project work and shall not be permitted for the remaining examinations of the subjects of that semester. *
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.*

*

1. General :

- Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
- The academic regulation should be read as a whole for the purpose of any interpretation.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

- ⇨ **Ragging within or outside any educational institution is prohibited.**
- ⇨ **Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student**

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	 2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	 10 Months	+	Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE MVGR A RAGGING FREE CAMPUS

Ragging

ABSOLUTELY NO TO RAGGING

1. **Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.**
2. **Ragging entails heavy fines and/or imprisonment.**
3. **Ragging invokes suspension and dismissal from the College.**
4. **Outsiders are prohibited from entering the College and Hostel without permission.**
5. **Girl students must be in their hostel rooms by 7.00 p.m.**
6. **All the students must carry their Identity Cards and show them when demanded**
7. **The Principal and the Wardens may visit the Hostels and inspect the rooms any time.**

PROGRAM STRUCTURE
M.TECH (VLSI)

Semester - I

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2VLT101	RTL Simulation and Synthesis with PLD's	3	--	--	3
2	A2VLT102	Digital IC Design	3	--	--	3
3	A2VLT2XX	Program Elective – I	3	--	--	3
4	A2VLT2XX	Program Elective - II	3	--	--	3
5	A2VLL101	RTL Simulation and Synthesis Lab	--	--	4	2
6	A2VLL102	CMOS Digital Design Lab	--	--	4	2
7	A2VLT105	Research Methodology & IPR	2	--	--	2
8	A2ACA50_	Audit Course - I	2	--	--	--
					Total Credits	**18**

Semester - II

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2VLT103	Analog IC Design	3	--	--	3
2	A2VLT104	Partial Reconfigurable FPGA	3	--	--	3
3	A2VLT2XX	Program Elective - III	3	--	--	3
4	A2VLT2XX	Program Elective - IV	3	--	--	3
5	A2VLL103	CMOS Analog Design Lab	--	--	4	2
6	A2VLL104	Reconfigurable Computing Lab	--	--	4	2
7	A2VLP401	Mini Project	--	--	4	2
8	A2ACA50_	Audit Course - II	2	--	--	--
					Total Credits	**18**

Semester – III

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2VLT2XX	Program Elective - V	3	--	--	3
2	A2OET3XX	Open Elective - I	3	--	--	3
3	A2VLP402	Dissertation Phase – I	--	--	20	10
					Total Credits	**16**

Semester – IV

S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A2VLP403	Dissertation Phase – II	--	--	32	16
					Total credits	16

Program Elective - I

1	A2VLT201	Memory Technologies
2	A2VLT202	Digital System Design
3	A2VLT203	MOS Device Modelling

Program Elective – II

1	A2VLT204	Full Custom Design
2	A2VLT205	Selected Topics in Mathematics
3	A2VLT206	System Modelling & Simulation

Program Elective - III

1	A2VLT207	Low power VLSI Design
2	A2VLT208	CMOS Mixed Signal VLSI Design
3	A2VLT209	VLSI Signal Processing

Program Elective - IV

1	A2VLT210	Testing and Testability
2	A2VLT211	Optimization Techniques & Applications to VLSI
3	A2VLT212	VLSI Physical Design Automation

Program Elective - V

1	A2VLT213	Communication Network
2	A2VLT214	SoC Architecture
3	A2VLT215	Scripting Languages

Open Elective - I

1	A2OET301	Business Analytics
2	A2OET302	Composite Materials
3	A2OET303	Cost Management of Engineering Projects
4	A2OET304	Industrial Safety
5	A2OET305	Operations Research
6	A2OET306	Waste to Energy

Audit Courses

1	A2ACA501	Constitution of India
2	A2ACA502	Disaster Management
3	A2ACA503	English for Research Paper Writing
4	A2ACA504	Pedagogy Studies
5	A2ACA505	Personality Development through Life Enlightenment Skills
6	A2ACA506	Sanskrit for Technical Knowledge
7	A2ACA507	Stress Management by Yoga
8	A2ACA508	Value Education

A2VLT101	SEMESTER - I	L	T	P	C
	RTL SIMULATION AND SYNTHESIS WITH PLD's	3	-	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT – I

Design Approaches : Top down approach to design, Design of FSMs (Synchronous and asynchronous), Static Timing analysis, Meta-stability, Clock issues, Need and design strategies for multi-clock domain designs

UNIT – II

Basics of Verilog HDL : Verilog as HDL, Levels of Design Description, Module, Syntax and Semantics of Verilog; Basic Language Elements- Keywords, Identifiers, White Space, Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Operators, Modelling Techniques, System Tasks and Compiler Directives.

UNIT – III

Programmable Devices : Programmable Logic Devices, Introduction to ASIC Design Flow, FPGA elements- basic blocks, Programming Technologies- OTP, reprogrammable, I/O blocks, Programmable interconnects, Software , SoC, ESD protection.

UNIT – IV

Field Programmable Gate Arrays: Organization of FPGAs, FPGA Programming Technologies, Programmable Logic Block Architectures, Programmable Interconnects, and Programmable I/O blocks in FPGAs, Dedicated Specialized Components of FPGAs and Applications of FPGAs.

UNIT – V

IP And Prototyping : IP in various forms: RTL Source code, Encrypted Source code, Soft IP, Net list, Physical IP, Use of external hard IP during prototyping. Case studies and Speed issues.

TEXT BOOKS:

1. Richard S. Sandige, Modern Digital Design, MGH, International Editions
2. Donald D Givone, Digital Principles and Design, TMH

REFERENCE BOOKS:

1. Field Programmable Gate Array Technology, Stephen M. Trimberger, Springer International Edition.
2. Samir Palnitkar, Verilog HDL, A Guide to Digital Design and Synthesis, Prentice Hall.

COURSE OUTCOMES:

CO1 : Students fully appreciate about the use of RTL in digital system design.
CO2 : Students gain the knowledge on Verilog HDL Coding.
CO3 : Students get an idea on Programmable Logic Devices design flow.
CO4 : Students fully appreciate about knowledge in FPGA's
CO5 : Students grasp the knowledge of IP's in prototyping.

Course designed by	Department of Electronics and Communication Engineering
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
	Ratified by: 5th Meeting of Academic Counceil,13-07-2019

A2VLT102	SEMESTER - I	L	T	P	C
	DIGITAL IC DESIGN	3	-	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT – I

MOS Inverters Static and Switching Characteristics: Resistive load inverter, Inverters with n-type MOSFET load, CMOS inverter, delay time definitions, Calculations of Delay Times, inverter design with delay constraints.

UNIT – II

Combinational MOS Logic Circuits: MOS logic circuits with depletion nmos loads, CMOS Logic Circuits, Complex Logic circuits, CMOS transmission gates (Pass Gates).

UNIT – III

Sequential & Dynamic Logic Circuits: Behavior of bistable elements, SR Latch Circuit, Clocked latch and flip-flop circuits, CMOS D-latch and edge triggered flip-flop, Basic principle of Pass transistor circuits, Voltage Boot strapping, Synchronous dynamic circuit techniques, Dynamic CMOS Circuit Techniques, High performance Dynamic CMOS circuits.

UNIT – IV

Semiconductor Memories: Introduction, MOS Decoders, Static RAM Cell Design, SRAM Column I/O Circuitry, Memory Architecture.

UNIT – V

Additional Topics In Memory Design: Introduction, Content-Addressable Memories (CAMs), Field Programmable Gate Array, Dynamic Read-Write Memories, Read-Only Memories, EPROMs, E^2PROMs, Flash Memory, FRAMs.

TEXT BOOKS:

1. CMOS Digital Integrated Circuits Analysis and Design, Sung-Mo Kang, TMH, Third Edition,, 2011.
2. Analysis and Design of Digital Integrated Circuits, David A. Hodges, Horace G. Jackson, and Resve A. Saleh, TMH, Third Edition, 2005.

REFERENCE BOOKS:

1. Digital Integrated Circuits, A Design Perspective, Jan M.Rabaey, Anantha Chandrakasan Borivoje Nikolic, Second Edition, PHI.
2. Digital Integrated Circuit Design, Ken Martin, Oxford University Press, 2011.

COURSE OUTCOMES:

CO1 : Students will be able to grasp the significance of MOS inverter static and switching characteristics.

CO2 : Student will be able to understand the combinational logic circuits.

CO3 : Students will be able to explain and analyze the sequential logic and dynamic logic circuits.

CO4 : Student will be able to grasp the significance of SRAM Read and Write Operations

CO5 : Student will be able to grasp the significance of DRAM, ROM, Flash Memory, FRAMs.

Course designed by	Department of Electronics and Communication Engineering
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
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A2VLT201	SEMESTER - I	L	T	P	C
	MEMORY TECHNOLOGIES	3	-	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT – I

Random Access Memory Technologies (SRAM) : SRAM Cell structures, MOS SRAM Architecture, MOS SRAM cell and peripheral circuit operation, Bipolar SRAM technologies, SOI technology, Advanced SRAM architectures and technologies, Application specific SRAMs.

UNIT – II

Random Access Memory Technologies (DRAM) : DRAM – DRAM technology development, CMOS DRAM, DRAM cell theory and advanced cell structures, BICMOS DRAM, soft error failure in DRAM, Advanced DRAM design and architecture, Application specific DRAM.

UNIT – III

Non-Volatile Memories : Masked ROMs, High density ROM, PROM, Bipolar ROM, CMOS PROMS, EPROM, Floating gate EPROM cell, One time programmable EPROM, EEPROM, EEPROM technology and architecture.
Non-volatile SRAM, Flash Memories (EPROM or EEPROM), advanced Flash memory architecture.

UNIT – IV

Memory Fault Modeling Testing : RAM fault modeling, Electrical testing, Pseudo Random testing, Megabit DRAM testing, non-volatile memory modeling and testing, IDDQ fault modeling and testing, Application specific memory testing.

UNIT – V

Advanced Memory Technologies : Introduction, Ferroelectric RAMs (FRAMs), Basic Theory, FRAM Cell and Memory operation, FRAM Technology Developments, FRAM Reliability Issues, FRAM Radiation Effects FRAM vs EEPROMs, GaAs FRAMs, Analog memories, magneto resistive RAMs (MRAMs), Experimental memory devices.

TEXT BOOKS:

1. Semiconductor Memories Technology – Ashok K. Sharma, 2002, Wiley.
2. Advanced Semiconductor Memories – Architecture, Design and Applications - Ashok K. Sharma- 2002, Wiley.

REFERENCE BOOKS:

1. Modern Semiconductor Devices for Integrated Circuits – Chenming C Hu, 1st Ed., Prentice Hall.
2. Digital Circuits Testing and Testability-P. K. Lala, Academic Press.

COURSE OUTCOMES:

CO1 : Students will fully appreciate about SRAM volatile memories in aspects of cell architectures, designs, technologies and applications.

CO2 : Students will fully appreciate about DRAM volatile memories in aspects of cell architectures, designs, technologies and applications.

CO3.: Students will fully appreciate about Non-Volatile memories in aspects of cell architectures, designs, technologies and applications.

CO4 : Students grasp the significance of fault modeling and testing of Volatile memory and Non-Volatile memory.

CO5 : Students will gain an Understanding of Advanced Memory Technologies.

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A2VLT202	SEMESTER - I	L	T	P	C
	DIGITAL SYSTEM DESIGN	3	-	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT– I

Minimization Procedures and CAMP Algorithm: Review on minimization of switching functions using tabular methods, k-map, QM algorithm, CAMP-I algorithm, Phase-I: Determination of Adjacencies, DA, CSC, SSMs and EPCs, CAMP-I algorithm, Phase-II: Passport checking, CAMP-II algorithm: Determination of solution cube, Cube based operations, determination of selected cubes are wholly within the given switching function or not, Introduction to cube based algorithms.

UNIT– II

PLA Design, PLA Minimization and Folding Algorithms: Introduction to PLDs, basic configurations and advantages of PLDs, PLA- Introduction, Block diagram of PLA, size of PLA, PLA design aspects, PLA minimization algorithm (IISc algorithm), PLA folding algorithm (COMPACT algorithm) - Illustration of algorithms with suitable examples.

UNIT– III

Design of Large Scale Digital Systems: Algorithmic state machine charts-Introduction, Derivation of SM Charts, Realization of SM Chart, control implementation, control unit design, data processor design, ROM design, PAL design aspects, digital system design approaches using CPLDs, FPGAs and ASICs.

UNIT– IV

Fault Diagnosis in Combinational Circuits: Faults classes and models, fault diagnosis and testing, fault detection test, test generation, testing process, obtaining a minimal complete test set, circuit under test methods - Path sensitization method, Boolean difference method, properties of Boolean differences, Kohavi algorithm, faults in PLAs, DFT schemes, built in self-test.

UNIT– V

Fault Diagnosis in Sequential Circuits: Fault detection and location in sequential circuits, circuit test approach, initial state identification, Hamming experiments, synchronizing experiments, machine identification, distinguishing experiment, adaptive distinguishing experiments.

TEXT BOOKS:

1. Logic Design Theory, N.N.Biswas, PHI.
2. Switching and Finite Automata Theory, Z.Kohavi, 2nd Edition, 2001, TMH.

REFERENCE BOOKS:

1. Fundamentals of Logic Design, Charles H.Roth, 5th Ed, Cengage Learning.
2. Digital Design, Morris Mano, 3rd Edition, Prentice Hall.

COURSE OUTCOMES:

CO1 : Students will be able to appreciate the minimization techniques like k-map, QM method and CAMP Algorithm.

CO2 : Student will be able to grasp the significance of State diagrams, reliable ASM charts and design of sequential circuits using ROMs, PLAs, CPLD and FPGAs.

CO3 : Students will be able to minimize digital circuits through PLA minimization and Folding.

CO4 : Student will be able to design and analyze various Test Generation methods.

CO5 : Student will be able to gain an understanding of Fault Diagnosis in Sequential Circuits.

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A2VLT203	SEMESTER - I	L	T	P	C
	MOS DEVICE MODELING	3	-	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT – I

Basic Device Physics: Energy bands in solids, p-n Junctions, MOS Capacitors, Metal-Silicon Effect and High Field Effects.

UNIT – II

MOSFET Devices: Long Channel MOSFET, Short-Channel MOSFETS, MOSFET Scaling
CMOS Devices Design: MOSFET Scaling, Threshold Voltage, MOSFET Chanel Length.

UNIT – III

CMOS Performance Factors: Basic CMOS Circuit Elements, Parasitic Elements, Sensitivity of CMOS delay to device parameters, Performance Factors of Advanced CMOS Devices.

UNIT – IV

Bipolar Devices: NPN & PNP Transistors, Ideal Current-Voltage Characteristics, Bipolar Device Models for Circuit and Time-Dependent Analyses, Break down Voltages.
Bipolar Device Design: Design of Emitter Region, Design of Base Region, Design of Collector Region, Si-Ge based Bipolar Transistors, Modern Bipolar Transistor Structures.

UNIT – V

Performance Factors: Performance factors of CMOS, Performance factors of bipolar devices.

TEXT BOOKS:

1. Yuan Taur and T H Ning, Fundamentals of Modern VLSI Devices, 2nd Edition, Cambridge.
2. M.S. Tyagi, Introduction to Semiconductor Materials and Devices, Wiley, 2008.

REFERENCE BOOKS:

1. Ben G Streetman, Solid State Electronic Devices, 6th Edition, Pearson Prentice-Hall, 2009
2. Principals of CMOS VLSI Design, N.H.E Weste, K. Eshraghian, 2nd Edition, Addison Wesley.

COURSE OUTCOMES:

CO1: Grasp the knowledge about basic device physics.
CO2 : Grasp the knowledge about MOSFET devices.
CO3: Have the ability to understand and analyze CMOS Performance Factors.
CO4 : Grasp the knowledge on Bipolar devices and Bipolar device design.
CO5 : Have the ability to understand about performance factors of CMOS and Bipolar devices

Course designed by	Department of Electronics and Communication Engineering
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A2VLT204	SEMESTER - I	L	T	P	C
	FULL CUSTOM DESIGN	3	-	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT – I

Introduction, IC Design Flow, Schematic Fundamentals, Layout Design, Introduction To CMOS VLSI Manufacturing Processes, Layers And Connectivity, Introduction To Transistor Layout, Process Design Rules, Vertical Connection Diagram, A General Procedure To Layout Design.

UNIT – II

Significance of Full Custom IC Design, Layout Design Flows, Microprocessor Design Flow. An Application-Specific Standard Product (ASSP), Memories, System on a Chip, CAD Tools as Part of a Flow.

UNIT – III

Advanced Techniques For Specialized Building Blocks, Standard Cell Libraries, Special Logic Cells, Pad Cells, Memory Design Leaf Cells, Laser Fuse Cells And Chip Finishing Cells

UNIT – IV

Advanced Techniques For Building Blocks, Power Grid, Clock Signals And Interconnect Routing. Interconnect Layout Design, Special Electrical Requirements, Layout Design Techniques To Address Electrical Characteristics.

UNIT – V

Layout Considerations Due To Process Constraints: Wide Metal Slits, Large Metal Via Implementations, Step Coverage Rules, Multiple Rule Sets, Antenna Rules, Special Design Rules, Latch-Up And Guard Rings, Constructing The Pad Ring, Minimizing Stress Effects. Guidelines For Proper Layout, Proper Layout CAD Tools For Layout, Planning Tools, Layout Generation Tools, Support Tools.

TEXT BOOKS:

1. Dan Clein, CMOS IC Layout Concepts Methodologies and Tools, Newnes, 2000.
2. CMOS: Circuit Design, Layout, and Simulation by R. Jacob Baker

REFERENCE BOOKS:

1. Ray Alan Hastings, The Art of Analog Layout, 2nd Edition, Prentice Hall, 2006
2. IC Mask Design: Essential Layout Techniques by Christopher Saint and Judy Saint.
3. Design of Analog CMOS Integrated Circuit by B Razavi

COURSE OUTCOMES:

CO1: Students will grasp the knowledge on IC design flow.
CO2: Students will have the ability to grasp the knowledge about Layout design flow,
CO3: Students will be able to design different types of layout leaf cells.
CO4: Students will be able to apply layout design knowledge on specialized types of interconnect design.
CO5: Students will be able to apply the knowledge on efficient layout techniques to absorb process variations.

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A2VLT205	SEMESTER - I	L	T	P	C
	Selected Topics in Mathematics	3	--	--	3
	Total Contact Hours – 48				

SYLLABUS

UNIT – I

Probability and Statistics: Definitions, conditional probability, Bayes Theorem and independence. Random Variables: Discrete, continuous and mixed random variables, probability mass, probability density and cumulative distribution functions, mathematical expectation, moments, moment generating function, Chebyshev inequality.

UNIT – II

Special Distributions : Discrete uniform, Binomial, Geometric, Poisson, Exponential, Gamma, Normal distributions, Pseudo random sequence generation with given distribution, Functions of a Random Variable

UNIT – III

Joint Distributions : Joint, marginal and conditional distributions, product moments, correlation, independence of random variables, bi-variate normal distribution.
Stochastic Processes: Definition and classification of stochastic processes, Poisson process, Norms, Statistical methods for ranking data.

UNIT – IV

Multivariate Data Analysis : Linear and non-linear models, Regression, Prediction and Estimation. Design of Experiments – factorial method, Response surface method

UNIT – V

Graphs: Basic terminology, multi graphs and weighted graphs, paths and circuits, shortest path Problems, Euler and Hamiltonian paths and circuits, factors of a graph, planar graph and Kuratowski's graph and theorem, independent sets, graph colouring.
Trees: Rooted trees, path length in rooted trees, binary search trees, spanning trees and cut set, theorems on spanning trees, cut sets , circuits, minimal spanning trees, Kruskal's and Prim's algorithms for minimal spanning tree.

TEXT BOOKS:

1. Henry Stark, John W. Woods, "Probability and Random Process with Applications to Signal Processing", Pearson Education, 3rd Edition.
2. C. L. Liu, "Elements of Discrete Mathematics", Tata McGraw-Hill, 2nd Edition.
3. Douglas C. Montgomery, E.A. Peck and G. G. Vining, "Introduction to Linear Regression Analysis", John Wiley and Sons, 2001.

REFERENCE BOOKS:

1. Douglas C. Montgomery, “Design and Analysis of Experiments”, John Wiley and Sons, 2001.
2. B. A. Ogunnaike, “Random Phenomena: Fundamentals of Probability and Statistics for Engineers”, CRC Press, 2010.

COURSE OUTCOMES

CO1 : Characterize and represent data collected from experiments using statistical methods.
CO2: Represent systems using the concepts of special distributions
CO3: Model physical process/systems with multiple variables towards parameter estimation and prediction
CO4: Perform trade studies across multiple dimensions while taking into account the effects of all variables on the responses of interest.
CO5: Represent systems/architectures using graphs and trees towards optimizing desired objective.

Course designed by	Department of Electronics and Communication Engineering
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
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A2VLT206	SEMESTER - I	L	T	P	C
	SYSTEM MODELING AND SIMULATION	3	-	-	3
	Total Contact Hours – 48				

SYLLABUS

UNIT – I

Introduction : Basic Simulation Modeling, Systems, Models and Simulation, Discrete Event Simulation, Simulation of single server queuing system, Simulation of Inventory System, Parallel/Distributed Simulation and the High level Architecture.

UNIT – II

Simulation Software and Models: Comparison of simulation packages with Programming languages, Classification of Simulation Software, Desirable Software features, General purpose simulation packages, Object Oriented Simulation, Examples of application oriented simulation packages. Guidelines for determining levels of model detail, Techniques for increasing model validity and credibility.

UNIT – III

Time and Event Driven Models: Modeling input signals, delays, System integration, Linear Systems, Motion control models, Numerical Experimentation, Simulation diagrams, Queuing theory, simulating queuing systems, and Types of Queues Multiple servers.

UNIT – IV

Markov Process: Disturbance signals, State Machines, Petri Nets & Analysis, System encapsulation, Probabilistic systems, Discrete Time Markov processes, Random walks, Poisson processes, the exponential distribution, simulating a poison process, and Continuous-Time Markov processes.

UNIT – V

System Optimization: System Identification, Searches, Alpha/beta trackers, Multidimensional Optimization, Modeling and Simulation methodology.

TEXT BOOKS:

1. System Modeling & Simulation, an Introduction, Frank L. Severance, John Wiley & Sons, 2001.
2. Simulation Modeling and Analysis. Averill M. Law, W. David Kelton, TMH, 3rd Edition, 2003.

REFERENCE BOOKS:

1. Systems Simulation, Geoffery Gordon, PHI, 1978.
2. System Modeling and Simulation, V. P. Singh, 1st Edition, New Age International.
3. Discrete-Event System Simulation, Jerry Banks , 5th Edition

COURSE OUTCOMES:

CO1: Students will grasp the knowledge on basic simulation modeling.

CO2: Students will have the ability to grasp the knowledge about software simulation models and their applications.

CO3: Students will be able to understand time and event driven models and simulations.

CO4: Students will grasp the knowledge on discrete and continuous time MARKOV process.

CO5: Students will be able to understand system optimization, modeling and simulation methodology.

Course designed by	Department of Electronics and Communication Engineering
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A2VLT105	SEMESTER - I	L	T	P	C
	Research Methodology and IPR	2	--	--	2
	Total Contact Hours – 30				

SYLLABUS

Unit – I

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

Unit – II

Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

Unit – III

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit – IV

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

Unit – V

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

TEXT BOOKS :

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall, "Industrial Design", McGraw Hill, 1992.
6. Niebel, "Product Design", McGraw Hill, 1974.
7. Asimov, "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.
9. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

COURSE OUTCOMES:

CO1: Understand research problem formulation.

CO2: Analyze research related information and Follow research ethics

CO3: Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.

CO4: Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.

CO5: Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

Course designed by	Department of Electronics and Communication Engineering
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A2VLL101	SEMESTER - I	L	T	P	C
	RTL SIMULATION AND SYNTHESIS LABORATORY	-	-	4	2
	Total Contact Hours – 48				

- The students are required to design the logic circuit, test bench to perform the following experiments using necessary simulator (Xilinx Vivado Simulator/ Mentor Graphics Model sim Simulator) to verify the logical/functional operation and to perform the analysis with appropriate synthesizer (Xilinx ISE Synthesizer/ Mentor Graphics Precision RTL) and then validate the implemented logic with different hardware modules/kits (ZED board).
- The students are required to acquire the knowledge in both the Platforms (Xilinx Vivado and Mentor graphics) by perform at least TEN experiments.

SYLLABUS

List of Experiments:

1. Realization of Logic Gates
2. SR,JK and T Flip Flop's
3. Priority Encoder
4. 8:1 Mux/Demux
5. 8-bit Magnitude comparator
6. Serial adder/ subtractor, parallel adder/subtractor, serial/parallel multiplier
7. Random Counter
8. Binary to Gray converter
9. Universal Shift Register
10. 4-bit Shift registers (SISO, SIPO, PISO, bidirectional)
11. 3-bit Synchronous Counters, Parity generator
12. Sequence generator/detectors, Synchronous FSM – Mealy and Moore machines

Lab Requirements:

Software:
Xilinx Vivado Suite, Precision RTL Synthesis, Model sim Simulator.

Hardware:
Personal Computer with necessary peripherals, configuration and operating system and relevant FPGA board hardware Kits.

COURSE OUTCOMES:

CO1 : Students fully appreciate about the use of Verilog HDL in digital system design.
CO2 : Students gain the knowledge on Xilinx Vivado Design suite.
CO3 : Students get an idea on design of digital circuits.
CO4 : Students get an exposure to Xilinx Vivado Synthesizer.
CO5 : Students grasp the knowledge of prototyping on FPGA board.

Course designed by	Department of Electronics and Communication Engineering
Approval	Approved by: Meeting of Board of Studies held on 29-06-2019
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A2VLL102	SEMESTER - I	L	T	P	C
	CMOS DIGITAL DESIGN LAB	-	-	4	2
	Total Contact Hours – 48				

- The students are required to design and implement the Circuit and Layout of any TEN Experiments using CMOS 130nm Technology with Mentor Graphics Tool.

SYLLABUS

List of Experiments:

1. Inverter Characteristics.
2. NAND and NOR Gate
3. XOR and XNOR Gate
4. 2:1 Multiplexer
5. Full Adder
6. RS-Latch
7. Clock Divider
8. JK-Master Slave Flip Flop
9. Synchronous Counter
10. Asynchronous Counter
11. Static RAM Cell
12. Dynamic Logic Circuit

Lab Requirements:

Software:

Mentor Graphics – Pyxis Schematic, IC Station, Calibre, ELDO Simulator

Hardware:

Personal Computer with necessary peripherals, configuration and operating System.

COURSE OUTCOMES:

CO1 : Students will be able to apply the knowledge of VLSI Design Methodologies using Mentor Graphics Tools.
CO2 : Student will be able to grasp the significance of various design logic Circuits in full-custom IC Design.
CO3 : Students will be able to apply the concepts of Physical Verification in Layout Extraction
CO4 : Student will be able to the design and analyze of CMOS Digital Circuits
CO5 : Student will be able to grasp the Significance of Pre-Layout Simulation and Post-Layout Simulation

Course designed by	Department of Electronics and Communication Engineering
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M.Tech(CNIS)

MAHARAJ VIJAYARAM GAPATHI RAJ COLLEGE OF ENGINEERING(AUTONOMOUS)
Vijayaram Nagar Campus, Chintalavalasa, Vizianagaram-535005, Andhra Pradesh
Accredited by NAAC with 'A' Grade & Listed u/s 2(f) & 12(B) of UGC
(Approved by AICTE, New Delhi and Permanently Affiliated by JNTUK-Kakinada)
NBA Accredited UG Courses: B.Tech(MEC), B.Tech(CIV), B.Tech(EEE), B.Tech(ECE), B.Tech(CSE), B.Tech(IT), B.Tech(MEC) & B.Tech(CHE) and PG Course: MBA

ACADEMIC REGULATIONS & CURRICULUM

M.Tech. (Computer Networks and Information Security)

Applicable to the students admitted from the
Academic year 2019-2020

MAHARAJ VIJAYARAM GAJAPATHI RAJ COLLEGE OF ENGINEERING

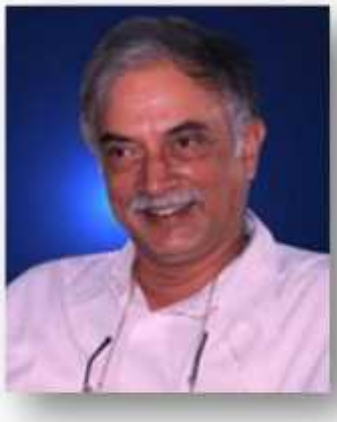
(Autonomous)

(Approved by AICTE, New Delhi, and permanently affiliated to JNTUK, Kakinada)
Re-Accredited by NBA, Re-accredidated by NAAC with 'A' Grade,
Listed u/s 2(f) & 12(B) of UGC Act 1956.
Vijayaram Nagar Campus, Chintalavalasa,
Vizianagaram-535005, Andhra Pradesh

The visionaries

Late Dr. P V G Raju
Raja Saheb of Vizianagaram
Founder Chairman-MANSAS
Ex-Minister for Education and Health, Govt. of AP
Ex Member of Parliament

Late Dr. P. Anand Gajapathi Raju
Ex-Chairman-MANSAS
Ex-Minister for Education and Health
Govt. of AP
Ex Member of Parliament



P. Ashok Gajapathi Raju
Chairman-MANSAS
Ex-Union Minister for Civil Aviation,
Govt. of India
Ex-Minister for Finance, Govt. of AP

Vision

Maharaj Vijayaram Gajapathi Raj College of Engineering strives to become a centre par excellence for technical education where aspiring students can be transformed into skilled and well-rounded professionals with strong understanding of fundamentals, a flair for responsible innovation in engineering practical solutions applying the fundamentals, and confidence and poise to meet the challenges in their chosen professional spheres.

Mission

The management believes imparting quality education in an atmosphere that motivates learning as a social obligation which we owe to the students, their parents/guardians and society at large and hence the effort is to leave no stone unturned in providing the same with all sincerity. Towards that end, the management believes special focus has to be on the following areas:

M1: Have on-board staff with high quality experience and continuously updating themselves with latest research developments and sharing that knowledge with students.

M2: Having a well stream-lined teaching learning process that is continuously assessed for effectiveness and fine-tuned for improvement.

M3: Having state-of-the-art lab and general infrastructure that gives students the necessary tools and means to enhance their knowledge and understanding.

M4: Having a centralized department focused on improving placement opportunities for our students directly on campus and coordinating the training programs for students to Complement the curriculum and enhance their career opportunities.

M5: Having advanced research facilities and more importantly atmosphere to encourage students to pursue self-learning on advanced topics and conduct research.

ABOUT THE INSTITUTION:

Maharajah Alak Narayan Society of Arts and Science (MANSAS) is an Educational Trust founded by Dr. (late) P.V.G Raju, Raja Saheb of Vizianagaram in the hallowed memory of his father Maharajah Alak Narayan Gajapati with a view to confound socio-economic inequalities in the Vizianagaram principality executing a trust deed on 12-11-1958 duly established Maharajah's College and other educational institutions in and around Vizianagaram. The Trust is a charitable one published under Section 6 a (1) of A.P Charitable and Hindu Religious Institutions and Endowment Act 30 of 1987.

The object of the Trust is to manage the properties of educational institutions under it and to promote and advance the cause of education in general, besides awarding scholarships to deserving students enabling them to undergo special training in science and industries in and out of India. The Trust has made an uncompromising contribution to the nation by presenting the stalwarts.

Trust offers KG to PhD level education in Arts, Sciences, Law, Pharmacy, Humanities Education, Engineering and Management and presently houses 13 Educational Institutions. MVGR College of Engineering is one of the 13 Institutes.

Other Institutions under MANSAS

1. M.R. HIGH SCHOOL 1857
2. M.R COLLEGE **(NAAC ACCREDITED)** 1879
3. M.R. COLLEGE OF EDUCATION 1950
4. M.R. WOMENS COLLEGE **(NAAC ACCREDITED)** 1962
5. M.R. GIRLS HIGH SCHOOL 1974
6. M.R. MODEL HIGH SCHOOL 1974
7. M.R. ENGLISH MEDIUM SCHOOL 1979
8. M.R.V.R.G.R LAW COLLEGE 1987
9. M.R. P.G. COLLEGE **(NAAC ACCREDITED)** 1987
10. M.R.SCHOOL OF MANAGEMENT STUDIES 1994
11. M.R.V.R.G.R – II MEMORIAL JR. COLLEGE 1994
12. M.R. COLLEGE OF PHARMACY 2004

Maharaj Vijayaram Gajapathi Raj (MVGR) College of Engineering was established in the year 1997 by Maharaj Alak Narayan Society for Arts and Sciences (MANSAS) to impart quality technical education. The Institution is located in lush green, serene and pollution free environment spread over 60 acres of land in Chintalavalasa village situated in the outskirts of Vizianagaram, a fort city in the north coastal region of Andhra Pradesh.

Institution at a glance:

- MVGR is a 22 years old institution, established in 1997
- All eligible UG Programs (CHEMICAL, CIVIL, CSE, ECE, EEE, IT & MECHANICAL) were re-accredited by NBA.
- MBA program was also re-accredited by NBA.
- Had been re-accredited with Grade ‘A’ by NAAC of UGC
- Has Permanent affiliation with JN Technological University-Kakinada
- Listed under sections 2(f) & 12(b) of UGC act 1956.
- Approved by AICTE-New Delhi
- EIGHT departments are recognized as RESEARCH CENTERS by JNTU-K
- Granted Autonomy by UGC in 2015
- Campus of 60 acre

- Offering 7 UG and 5 M.Tech and MBA program
- About 250 faculty of which 84 Ph.D. Degree holders
- 83 Laboratories with an investment of about 13 crores
- Total built up area of about 7 Lakh sft
- About 42,000 volumes and Access to 8 international online journal packages like IEEE, SPRINGER, etc.
- 1420 Systems & 395 Mbps band width internet facility
- About Rs. 4 crore worth of on-going R&D projects
- Actively involved in civil engineering consultancy work as Third Party Quality Auditor for Vizianagaram Municipality
- WIPRO Recognized technology learning center and MISSION 10X partner institution
- Recognized National Instruments Academy for Training in LabView
- SIRO Recognition by DSIR
- Recognized PTC Centre of Excellence for Creo Training
- Identified by MSME as Business Incubation Centre
- APSSDC-Siemens Technical Skill Development Institute
- Recognized CMs SKILL EXCELLENCY CENTER (SEC)
- Micrsoft Ed-vantage Platinum Partner
- Institutional member of IUCEE
- Institutional Member of CII
- Member, Chamber of Commerce, Vizianagaram
- Green Campus award by Govt. of AP

MVGR College of Engineering is rated as one among the best engineering colleges in the state of Andhra Pradesh as it set up highest standards in all areas of curricular, co-curricular and extra-curricular activities and in students' placements. Based on industry and expert's feedback, the college is updating the curriculum from time to time. The college offers many value added add-on courses students and conducts training programs to meet the industries' requirements.

Academic Regulations for M.Tech. Program

Applicable to the students admitted from the Academic year 2019-20 onwards.

1. PROGRAM STRUCTURE:

M.TECH:

S.No	Category	Credits
1	Program core courses	16
2	Program Elective courses	19
3	Open Electives	3
4	Research Methodology and IPR	2
5	Mini Project with seminar	2
6	Dissertation / Industrial Project	26
7	Audit courses 2	0
	Total	68

Open Elective

1. Business Analytics
2. Composite Materials
3. Cost Management of Engineering Projects
4. Industrial Safety
5. Operations Research
6. Waste to Energy

Audit course 1 & 2

1. Constitution of India
2. Disaster Management
3. English for Research Paper Writing
4. Pedagogy Studies
5. Personality Development through Life Enlightenment Skills.
6. Sanskrit for Technical Knowledge
7. Stress Management by Yoga
8. Value Education

2. PROGRAM PATTERN:

The program is for 2 academic years - 4 semesters.

3. AWARD OF DEGREE:

A student will be declared eligible for the award of degree if he/she fulfills the following academic regulations.

- A student shall be declared eligible for the award of the degree, if he/she pursues a course of study for not less than two academic years and not more than four academic years.

- A student shall register for **68** credits and secure all **68** credits.
- Students who fail to complete Two Years Course of study within Four years shall forfeit their seat and their admission stand cancelled.

4. CERTIFICATION PROGRAMS:

S.No.	Dept	Name of the Program
1	MECH	Windchill 10.2 PDM by Adroitec Engineering Solutions Pvt. Ltd., Hyderabad
2	MECH	Creo 2.0 by PTC
3	MECH	Edgecam by Verosoft, UK
4	MECH	ANSYS Training and Certification by Mechanical Department
5	MECH	AUTOCAD Training and Certification by Mechanical Department
6	MECH	Catia by APSSDC-Dassault Systemes, CM's Center of Excellence
7	MECH	Delmia by APSSDC-Dassault Systemes, CM's Center of Excellence
8	MECH	Simulia by APSSDC-Dassault Systemes, CM's Center of Excellence
9	MECH	2-Wheeler Automobile Certification by APSSDC-SIEMENS
10	MECH	4-Wheeler Automobile Certification by APSSDC-SIEMENS
11	MECH	Welding Certification by APSSDC-SIEMENS
12	MECH	CNC Certification by APSSDC-SIEMENS
13	MECH	Commercial Electrical Certification by APSSDC-SIEMENS
14	MECH	Solid Edge Certification by APSSDC-SIEMENS
15	CHEM	Chemical Process Design and Simulation by Simtech Simulations, Hyderabad
16	ECE	Embedded Systems by ThinkLABS, Mumbai
17	ECE	Labview by National Instruments Systems India Pvt. Ltd.
18	ECE	Unified Technology Learning Program (UTLP) by Wipro Mission 10X
19	CSE, IT	PEGA by Virtusa Corporation
20	CSE, IT	Microsoft technologies by Microsoft Corp.
21	CSE, IT	Ethical Hacking by EC-Council Academia
22	CSE, IT	Java and C by Talent Sprint
23	CSE, IT	Network Analyst (CCNA) by Cisco Systems Inc
24	CSE, IT	Java Programming (OCJP) and DBMS by Oracle
25	EEE	PLC, Drives and Automation by Siemens
26	EEE	PLC by New Dawn Automation
27	EEE	Home Electrical Certification by APSSDC-SIEMENS
28	Civil	Remote Sensing and GIS by Indian Institute of Remote Sensing

a) The Institution shall offer the certification programs by itself or in collaboration with industry/such other Institutions deemed to have specialized expertise in the proposed area of training.

b) Only students of the Institution shall be eligible to register on payment of prescribed fee.

c) However, subject to availability of resources and the demand the Institution may offer the program to external candidates meeting the pre-qualification requirements and in the order of the merit.

d) The duration of the course and design of the content shall be done by the respective departments of the Institution by themselves or in collaboration with industry/such other institutions deemed to have specialized expertise in the proposed area of training.

e) If the duration of the course is less than or equal to 40 hours, it can be completed in one semester, otherwise, it can suitably distributed over a number of semesters.

f) Mere enrolment/registration for the program shall not entitle any claim for award of certificate.

g) A candidate shall be deemed eligible for the award of the certificate if he/she

- Attends at least 75% of scheduled training sessions
- Complies to all the requirements of submission of the assignments, presentations, seminars, projects, etc., and also appears for periodic tests.
- Shall attain minimum levels of performance in tests as prescribed.
- Shall remit such fee as deemed fit for the certification
- A candidate registered and failed to meet the requirements shall be permitted to repeat the said training one another time after remitting 25% of the fee fixed for the program as re-registration fee.

If the student is absent for the periodic tests, the test shall be re-conducted on payment of 10% of fee.

5. COURSES OFFERED:

Name of the Program	Degree
UG Programs (Engineering & Technology)	B.Tech (Civil) B.Tech.(EEE) B.Tech.(Mech.) B.Tech.(ECE) B.Tech.(CSE) B.Tech.(CHEM) B.Tech.(IT)
PG Programs (Engineering & Technology)	M.Tech.(Structural Engineering) M.Tech. (Power Systems) M.Tech.(PDM) M.Tech.(VLSI) M.Tech.(CN&IS)
Other PG Programs	MBA
Research Programs	Ph.D in Civil, EEE, MECH, ECE, CSE, CHEM, MBA and MATHS

6. DISTRIBUTION AND WEIGHTAGE OF MARKS:

All Theory courses will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment:

- **Subjective tests – 30 Marks**
- **Assignments - 10 Marks**
    - Two subjective tests shall be conducted each for 30 Marks.
    - Each subjective test shall be conducted for 90 Minutes and have 3 questions each for 10 marks (No choice).
    - Average of the two subjective tests shall be considered as performance in internals.
    - Assignments shall be assessed for 10 marks.

Semester End Assessment:

- Semester End examination is for 60 marks (180 min). Question paper contains 5 questions (one from each unit with internal choice). Each question carries 12 marks. A student shall answer all 5 questions.

a) LABORATORY/PRACTICE:

All Laboratory/Practice courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for Semester End Examination.

Internal assessment: (40 Marks)

- Continuous assessment: :20 Marks
- Internal test: :20 Marks

Semester End Assessment: (60 Marks)

- Semester End Examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Both internal and semester end examination shall include assessment of the student on
    - ❑ Knowledge of principles/concepts involved
    - ❑ Experimental design
    - ❑ Result interpretation and analysis
    - ❑ Experimental report

b) DRAWING/DESIGN/ESTIMATION:

These courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end examination.

- Continuous assessment for 20 marks for each unit finally averaged to 20 marks.
- Two internal assessment tests are conducted during the semester which shall be assessed for another 20 marks by taking the average.

c) Research Methodology & IPR shall be evaluated internally for 50 marks by PRC at the end of I semester

d) Mini Project with Seminar shall be evaluated internally for 50 marks by PRC in the II semester

e) For **audit course** a student is deemed to satisfy the minimum contact hours, as prescribed by the department and shall also comply with the requirements for submission of assignments/projects. A student shall also opt for MOOCs and submit the certificate after completion of the course.

f) PROJECT EVALUATION:

Duration is TWO semesters –Minimum of 40 weeks period is mandatory to submit.

- PRC includes HOD and two other senior faculties, one being the guide.
- To register for project work, a student shall complete all the course work requirements of I and II semesters.
- The progress of the work shall be periodically reviewed by PRC.
- The PRC shall authorize /approve change of guide/topic/title as deemed fit.
- A student shall submit Status Report in line with the recommended project calendar as approved by PRC.
- Student has to submit draft copy of thesis/dissertation to PRC, and also shall make an oral presentation. He/she shall publish the work in journal or international conference of repute and relevance.
- A student shall make 5 copies of PRC approved work and submit.
- Candidates who have successfully passed all theory and lab courses shall be eligible for submitting the thesis.
- The thesis shall be adjudicated by the internal & external examiners and Head of the department.
- Student shall be examined for his contributions, knowledge along with the quality of the work through presentations and Viva-voce.
- The assessment of work shall be done on the following lines:
  - **Project phase -I** which includes Problem definition, Literature survey, tool specific knowledge shall be evaluated internally for 100 marks by PRC at the end of III semester.

- **Project phase II** shall be evaluated for 300 marks at the end of IV semester. Out of 300 marks, 120 marks shall be evaluated internally by PRC and remaining 180 marks shall be evaluated externally by the internal and external examiner.

- The evaluation of Project phase II shall be made on the following aspects.
    - Experimental/methodology design
    - Result analysis and interpretations
    - Report writing
    - Presentation
    - Viva-voce

7. ATTENDANCE REGULATIONS:

- A student shall be eligible to appear for end semester examinations, if he or she acquires a minimum of 75% of attendance in aggregate of all the subjects (Theory & Lab.) for the semester.
- Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the college academic committee.
- Shortage of attendance below 65% in aggregate of all the subjects (Theory & Lab) for the semester shall not be Condoned.
- Detained student shall seek re- admission for that semester when offered within 4 weeks from the date of commencement of class work.

8. MINIMUM ACADEMIC REQUIREMENTS:

- A student is deemed to have satisfied the minimum academic requirements for a course on securing at least 24 marks out of 60 marks at semester end examination and overall minimum of 50 marks out of 100 marks including internal assessment.

9. GRADING SYSTEM:

Semester Grade Point Average (SGPA) for the current semester which is calculated on the basis of grade points obtained in all courses, except audit courses and courses in which satisfactory or course continuation has been awarded,

$$SGPA = \Sigma \text{ (course credits earned x Grade points)} / \Sigma \text{ (Total course credits in the semester.}$$

CGPA= Σ (course credits earned x Grade points) up to successfully completed semesters / Σ (Total course credits up to successfully completed semesters)

The UGC recommends a 10-point grading system with the following letter grades as given below:

O	(Outstanding)	10
A+	(Excellent)	9
A	(Very Good)	8
B+	(Good)	7
B	(Above Average)	6
P	(Pass)	5
F	(Fail)	0
Ab	(Absent)	0

- iii. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X 10= 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			**139**

Thus, **SGPA** =139/20 = 6.95

Illustration for CGPA

Semester 1	**Semester 2**	**Semester 3**	**Semester 4**
Credit : 18	Credit : 18	Credit : 16	Credit : 16
SGPA:7.9	SGPA: 7.8	SGPA: 7.6	SGPA: 8.0

Thus, **CGPA** = 18 x 7.9 + 18 x 7.8 + 16 x 7.6 + 16 x 8.0

$$\frac{142.2+140.4+121.6+128}{} = \mathbf{7.83}$$

10. ELIGIBILITY FOR AWARD OF DEGREE:

M.Tech.:

A student shall be eligible for award of the degree if he/she fulfills the following conditions:

1) Successfully completes all the courses prescribed for the Program.
2) CGPA greater than or equal to 5.5(Minimum requirement for Pass),

11. AWARD OF CLASS:

Eligible candidates for the award of M.Tech. Degree shall be placed in one of the following Classes based on CGPA.

Class	CGPA
Distinction	≥ 7.5
First Class	≥ 6.5
Pass Class	≥ 5.5

12. INSTRUCTION DAYS

A semester shall have a minimum of 90 clear instruction days.

13. TRANSFERS FROM OTHER INSTITUTIONS SHALL NOT BE PERMITTED.

14. SUPPLEMENTARY EXAMINATIONS

Supplementary examinations shall be conducted along with regular examinations.

15. WITHHOLDING OF RESULTS

The result of a student shall be withheld

- If the student has not paid the dues, if any, to the institution.
- If any case of pending disciplinary action
- Involvement in any sort of malpractices etc.
- Involvement in ragging.

16. TRANSITORY REGULATIONS

A Candidate shall be readmitted from University regulations to A1 regulations or from A1 regulations to A2 regulations as per the guide lines of JNTUK.

17. AMENDMENTS TO REGULATIONS:

The Academic Council of MVGR College of Engineering (Autonomous) reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations, and/ or Syllabi or any other such matter relating to the requirements of the program which are compatible to the contemporary/emerging trends effectively meeting the needs of society/industry/stake holding groups.

18. Regulations for MALPRACTICES during the conduct of examinations

	Nature of Malpractices/Improper conduct	Punishment
1 (a)	If the candidate possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only. *
(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. *
2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled. *
3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an

		outsider/candidate not on rolls, he will be handed over to the police and a case is registered against him. *
4	If the candidate mishandles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. Also if the answer script is mutilated / damaged disturbing the shape, of the script, answers, the bar code intentionally.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. He shall be debarred from class work and all examinations and be allowed to reregistered for the next subsequent odd or even semester only. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.*
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	The same should be brought to the notice of CE who in turn in consultation with malpractice committee makes decision for cancellation of the performance in that subject. *
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. *
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and

		all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. *
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. *
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. *
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and

		project work and shall not be permitted for the remaining examinations of the subjects of that semester. *
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.*

*

1. General :

- Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
- The academic regulation should be read as a whole for the purpose of any interpretation.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

- ⇨ **Ragging within or outside any educational institution is prohibited.**
- ⇨ **Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student**

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	 2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	 10 Months	+	Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE MVGR A RAGGING FREE CAMPUS

Ragging

ABSOLUTELY NO TO RAGGING

1. **Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.**
2. **Ragging entails heavy fines and/or imprisonment.**
3. **Ragging invokes suspension and dismissal from the College.**
4. **Outsiders are prohibited from entering the College and Hostel without permission.**
5. **Girl students must be in their hostel rooms by 7.00 p.m.**
6. **All the students must carry their Identity Cards and show them when demanded**
7. **The Principal and the Wardens may visit the Hostels and inspect the rooms any time.**

M.Tech, CSE (Computer Networks and Information Security)

Semester I					
Course Number	Subject	Scheme of studies per week			Credits
		L	T	P	
A2CNT101	Computer Networks Engineering	3	0	0	3
A2CNT102	Cryptography and Information Security	3	0	0	3
A2CNT2xx	Program Elective I	3	0	0	3
A2CNT2xx	Program Elective II	3	0	0	3
A2CNT105	Research Methodology and IPR	2	0	0	2
A2ACA5xx	Audit Course	2	0	0	0
A2CNL101	Computer Networks Engineering Lab	0	0	4	2
A2CNL201	Ethical Hacking Lab	0	0	4	2
Total Credits 18					

Semester II					
Course Number	Subject	Scheme of studies per week			Credits
		L	T	P	
A2CNT103	Program Core I - Internet of Things	3	0	0	3
A2CNT104	Program Core II – Information Security Management and Standards	3	0	0	3
A2CNE2xx	Program Elective III	3	0	0	3
A2CNE2xx	Program Elective IV	3	0	0	3
A2CNP401	Mini Project With Seminar	2	0	0	2
A2ACA5xx	Audit Course	2	0	0	0
A2CNL102	IoT Lab	0	0	4	2
A2CNL202	Python Programming Lab	0	0	4	2
Total Credits 18					

Semester III					
Course Number	Subject	Scheme of studies per week			Credits
		L	T	P	
A2CNT2xx	Program Elective V	3	0	0	3
A2OET3xx	Open Elective	3	0	0	3
A2CNP402	Dissertation I / Industrial Project	0	0	20	10
Total Credits 16					

Semester IV					
Course Number	Subject	Scheme of studies per week			Credits
		L	T	P	
A2CNP403	Dissertation II	0	0	32	16
Total Credits 16					

Elective - I		
S. No	**Subject Code**	**Subject**
1	A2CNT201	Ethical Hacking
2	A2CNT202	Digital Forensics
3	A2CNT203	Soft Computing

Elective - II		
S. No	**Subject Code**	**Subject**
1	A2CNT204	Data Storage Technologies and Networks
2	A2CNT205	Network Perimeter Security
3	A2CNT206	Sensor and Ad-hoc networks

Elective - III		
S. No	**Subject Code**	**Subject**
1	A2CNT207	Database Security and Access Control
2	A2CNT208	Secure Coding
3	A2CNT209	Python Programming

Elective – IV		
S. No	**Subject Code**	**Subject**
1	A2CNT210	Data Mining
2	A2CNT211	Web Technologies
3	A2CNT212	Steganography & Digital Water Marking

Elective – V		
S. No	**Subject Code**	**Subject**
1	A2CNT213	Software Defined Networks
2	A2CNT214	Malware Analysis and Reverse Engineering
3	A2CNT215	Biometrics

Open Elective		
S. No	**Subject Code**	**Subject**
1	A2OET301	Business Analytics
2	A2OET302	Composite Materials
3	A2OET303	Cost Management of Engineering Projects
4	A2OET304	Industrial Safety
5	A2OET305	Operations Research
6	A2OET306	Waste to Energy

Audit Courses		
S. No	**Subject Code**	**Subject**
1	A2ACA501	Constitution of India
2	A2ACA502	Disaster Management
3	A2ACA503	English for Research Paper Writing
4	A2ACA504	Pedagogy Studies
5	A2ACA505	Personality Development through Life Enlightenment Skills
6	A2ACA506	Sanskrit for Technical Knowledge
7	A2ACA507	Stress Management by Yoga
8	A2ACA508	Value Education

Subject Code	SEMESTER - I	Scheme of studies per week			Credits
		L	T	P	
A2CNT101	Computer Networks Engineering	3	0	0	3
	Total Lecture Hours: 45				

SYLLABUS

UNIT-1: (Introduction)
Internetworking, basics, models, OSI Model, Ethernet networking, cabling, data encapsulation, three layer hierarchical model, Introduction to TCP/IP, TCP/IP and the DoD model, IP addressing, broadcast addresses, Subnetting and VLSM.

UNIT-2: (IP Routing)
Routing basics, The IP Routing process, Configuring IP routing in our network, static routing, default routing, dynamic routing protocols, RIP, RIPv2, EIGRP features and operation, using EIGRP to support large networks, configuring EIGRP, load balancing with EIGRP, verifying EIGRP.

UNIT-3: (OSPF and Switching)
OSPF basics, configuring, verifying, DR and BDR elections, OSPF and loop back interfaces, configuring summary routes. Layer 2 Switching and Spanning tree protocol, before layer 2 switching, switching services, STP, Configuring catalyst switch.

UNIT-4: (VLANs and Security)
VLAN Basics, VLAN Memberships, Identifying VLANS, VLAN Trunking Protocol (VTP), Routing between VLANs, configuring VLANs, configuring VTP, Inter VLAN routing. Perimeter Firewall and Internal routers, recognizing security threats, mitigating security threats, Introduction to ACLs, standard ACL, extended ACL.

UNIT-5: (IPv6 and Introduction to WAN)
Why do we need IPv6, Benefits and uses, IPv6 addressing and expressions, how IPv6 works, IPv6 routing protocols, Migrating to IPv6, Introduction to WAN, Cable and DSL, Cabling the serial WAN, HDLC, PPP.

COURSE OUTCOMES:
At the end of the course the student shall be able to:

1. Ability to understand the difference between OSI model and TCP/IP protocol suite.
2. Ability to identify IPv4 address classes, and also be able to perform sub-netting and super-netting.
3. Ability to choose a particular routing protocol (static or dynamic) and be able to configure the routers.
4. Ability to understand the role of switch at layer 2 and be able to configure, switch port security, VLAN's, VTP etc.
5. Ability to explain IPv6 addressing scheme and understand the concepts of WAN protocols.
6. Ability to design networks and configure the intermediate devices along with basic security features.
7. Fully appreciate the role of a network engineer in designing small to medium scale networks.

TEXT BOOKS:

1. **Todd Lammle.***CCNA: CISCO Certified Network Associate Study Guide.* 6th ed. Indianapolis : Wiley Publishing Inc., 2007.

References:

1. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, Keith W.Ross, Fifth Edition, Pearson Education, 2012.
2. Computer Networks: A Systems approach, Larry L. Peterson & Bruce S. Davie, Fifth edition, Elsevier, rp2012.

Subject Code	SEMESTER - I	Scheme of studies per week			Credits
		L	T	P	
A2CNT102	Cryptography and Information Security	3	0	0	3
	Total Lecture Hours: 45				

SYLLABUS

UNIT-1

Security goals, attacks, services and mechanism, techniques. Mathematics for cryptography: integer arithmetic, modular arithmetic, matrices, linear congruence. Symmetric Cryptography: Introduction, Substitution ciphers, Transposition ciphers

UNIT-2

Stream and Block ciphers. Algebraic structures, GF fields. Modern block ciphers, modern stream ciphers, DES: Introduction, DES structure, analysis, multiple DES, security of DES.

UNIT-3

AES: Introduction, transformations, key expansion, ciphers. Primes, Primality testing, factorization, Chinese remainder theorem, quadratic congruence, exponentiation and logarithm

UNIT-4

Asymmetric cryptosystem: RSA and Elliptic Curve cryptosystems. Message integrity, message authentication.

UNIT-5

Cryptographic HASH functions: Introduction, SHA-512, Digital Signature: Comparison, process, services, attacks on digital signature. Digital signature schemes: RSA and DSS.

Text Book:

Cryptography and Network Security, Behrouz A. Forouzan, Tata McGraw Hill.

COURSE OUTCOMES:

At the end of the course the student shall be able to:

1. List various security goals, attacks and mechanisms.
2. Have a knowledge of basic mathematics required for cryptography.
3. Explain the symmetric and asymmetric cryptographic algorithms like DES, AES, RSA, and ECC
4. Explain cryptographic hash functions and digital signatures.

Subject Code	SEMESTER - I	Scheme of studies per week			Credits
		L	T	P	
A2CNT201	**Ethical Hacking**	**3**	**0**	**0**	**3**
	Total Lecture Hours: 45				

SYLLABUS

Unit 1: Introduction, Foot Printing & Reconnaissance

Introduction: Hacking: A Short History, the Early Days of Hacking, Current Developments, Hacking: Fun or Criminal Activity? The Evolution and Growth of Hacking, What Is an Ethical Hacker?, Ethical Hacking and Penetration Testing, Hacking Methodologies, Vulnerability Research and Tools, Ethics and the Law. **Foot Printing and Reconnaissance:** Understanding the Steps of Ethical Hacking Phase 1: Foot printing Phase 2: Scanning Phase 3: Enumeration Phase 4: System Hacking, What Is Foot printing? Why Perform Foot printing? Goals of the Foot printing Process, Terminology in Foot printing, Open Source and Passive Information Gathering, Active Information Gathering, Pseudonymous Foot printing Internet Foot printing, Threats Introduced by Foot printing, The Foot printing Process, Using Search Engines, Location and Geography, Social Networking and Information Gathering, Financial Services and Information Gathering, The Value of Job Sites, Working with E-mail, Competitive Analysis, Google Hacking. (Chapter 1 & 4, Book 1)

Unit 2: Scanning & Enumeration

What Is Network Scanning?, Checking for Live Systems, Wardialing, Wardriving, Pinging, Port Scanning, Checking for Open Ports, Types of Scans: Full Open Scan, Stealth Scan, or Half-open Scan, Xmas Tree Scan, FIN Scan, NULL Scan, ACK Scanning, UDP Scanning, OS Fingerprinting, Banner Grabbing, Countermeasures, Vulnerability Scanning, Drawing Network Diagrams, Using Proxies, Setting a Web Browser to Use a Proxy. Enumeration: A Quick Review, Foot printing, Scanning, What Is Enumeration? Windows Basics, Users, Groups, Security Identifiers, Services and Ports of Interest, Commonly Exploited Services, NULL Sessions, SuperScan, the PsTools Suite, Enumeration with SNMP, Management Information Base, SNScan, Unix and Linux Enumeration, LDAP and Directory Service Enumeration, Enumeration Using NTP, SMTP Enumeration (From Chapter 5&6, Book 1)

Unit 3: Gaining Access, Sniffers

System Hacking, password cracking, password cracking techniques, passive online attacks, active online attacks, offline attacks, rainbow tables, distributed network attacks, other options for obtaining passwords, authentication to Microsoft platforms, executing applications, covering your tracks. Sniffers: Understanding sniffers, Understanding Sniffers, Using a Sniffer, Sniffing Tools, Wireshark, TCPdump, Reading Sniffer Output, Switched Network Sniffing, MAC Flooding, ARP Poisoning, MAC Spoofing, Port Mirror or SPAN Port, On the Defensive, Mitigating MAC Flooding, Detecting Sniffing Attacks. (From Chapter 7 & 9 of Book 1)

Unit 4: DoS attacks, Session Hijacking

Understanding DoS, DoS Targets, Types of Attacks, Buffer Overflow, Understanding DDoS, DDoS Attacks, DoS Tools, DDoS Tools, DoS Defensive Strategies, Botnet-Specific Defences, DoS Pen Testing Considerations. Understanding Session Hijacking, Spoofing vs. Hijacking, Active and Passive Attacks, Session Hijacking and Web Apps, Types of Application-Level Session Hijacking, A Few Key Concepts, Network Session Hijacking, Exploring Defensive Strategies.
(Chapters 11 & 12 of Book 1)

Unit 5: Web Servers, Web applications and SQL Injection.

Exploring the Client-Server Relationship, the Client and the Server, Closer Inspection of a Web Application, Vulnerabilities of Web Servers and Applications, Common Flaws and Attack Methods. Introducing SQL Injection, Results of SQL Injection, the Anatomy of a Web Application, Databases and Their Vulnerabilities, Anatomy of a SQL Injection Attack, Altering Data with a SQL, Injection Attack, Injecting Blind, Information Gathering, Evading Detection Mechanisms, SQL Injection Countermeasures. (Chapters 13 & 14 of Book 1)

Text Book:
CEHv8 Certified Ethical Hacker Version 8 Study Guide, by Sean-Philip Oriyano, Sybex (A Wiley Brand) ISBN: 978-1-118-64767-7

COURSE OUTCOMES:

At the end of the course the students shall

1. Have the ability to understand the need for penetration testing and ethical hacking and be able to appreciate the basic terminology and jargon of ethical hacking and phases.
2. Have the ability to perform foot printing and reconnaissance using various tools and also able to grasp how to defend against the same.
3. Have the ability to understand and know how sniffers will work and how to perform sniffing and also have the ability to use tools for gaining access.
4. Have the ability to understand the consequences of DoS and DDoS attacks and also know how to execute and defend against such attacks.
5. Have the ability to grasp the significance of session hijacking and its procedure and defense strategies.
6. Have the ability to explore the vulnerabilities of web applications and web servers and be able to perform SQL injection attacks.
7. Have the ability to fully appreciate the different phases of ethical hacking to perform penetration testing at systems and networks level.

Subject Code	SEMESTER - I	Scheme of studies per week			Credits
		L	T	P	
A2CNT202	**Digital Forensics**	**3**	**0**	**0**	**3**
	Total Lecture Hours: 45				

SYLLABUS

UNIT I :

Introduction to Forensics and Investigations, and Incident Response.
Understanding computer forensics, preparing for computer investigations, maintaining professional conduct, preparing a computer investigation, taking a systematic approach, procedures for corporate High-Tech investigations, understanding data recovery workstations and software, conducting an investigation. (Chapters 1 & 2)

UNIT II:

The investigators office and laboratory:
Understanding forensics lab certification requirements, determining the physical requirements for the computer forensics lab, selecting a basic forensic workstation, building a business case for developing a forensic lab. (Chapter 3)
Data Acquisition.
Data acquisition, understanding storage formats for digital evidence, determine the best acquisition method, contingency planning for image acquisition, using acquisition tools, validating data acquisitions, performing RAID data acquisitions, using remote network acquisition tools, other forensics acquisition tools, processing crime and incident scenes. (Chapter 4)

UNIT III:

Processing crime and incident scenes.
Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene, seizing and storing digital evidence, obtaining a digital hash, reviewing a case(Chapters 5)

UNIT IV:

Working with windows, DOS systems, Linux file systems.
Understanding file systems, exploring Microsoft file structure, NTFS disks, Whole disk encryption, Windows registry, Microsoft Startup tasks, MS-DOS startup tasks, Virtual machines, Unix and Linux disk structure and boot processes. (Chapter 6 and 8)

UNIT V:

Forensic Tools, Recovering Graphic files.
Evaluatingcomputer forensics tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software. (Chapter 7)
Recovering graphics files, understanding data compression, locating and recovering graphic files, identifying unknown file formats, Copyright issues with graphics. (Chapter 10)

Text Book:

1. Guide to Computer Forensics and Investigations, 4th Edition, Nelson, Phillips and Steuart, Cengage Learning.

COURSE OUTCOMES:

At the end of the course the students shall

1. Have the ability to understand the basics of forensics and investigations, and incident response.
2. Have the knowledge and understanding of data acquisition evidencecollection.
3. Have the ability to work with different OS platforms and Virtualmachines.
4. Have an understanding of forensic tools for analyzing forensic data, recovering files.
5. Have the knowledge of network and email forensics, and reportwriting.
6. Fully appreciate the need and be able to grasp the several computer forensic

Subject Code	SEMESTER - I	Scheme of studies per week			Credits
		L	T	P	
A2CNT203	**Soft Computing**	**3**	**0**	**0**	**3**
	Total Lecture Hours: 45				

Unit 1

INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics

Unit 2

FUZZY LOGIC: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making.

Unit 3

NEURAL NETWORKS: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks: Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks

Unit 4

GENETIC ALGORITHMS: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning: Machine Learning Approach to Knowledge Acquisition.

Unit 5

Matlab/Python Lib: Introduction to Matlab/Python, Arrays and array operations, Functions and Files, Study of neural network toolbox and fuzzy logic toolbox, Simple implementation of Artificial Neural Network and Fuzzy Logic. Recent Trends in deep learning, various classifiers, neural networks and genetic algorithm.

Text Books:

1. Jyh:Shing Roger Jang, Chuen:Tsai Sun, EijiMizutani, Neuro:Fuzzy and Soft Computing, Prentice:Hall of India, 2003.
2. George J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic:Theory and Applications , Prentice Hall, 1995.
3. MATLAB Toolkit Manual

COURSE OUTCOMES

After completion of course, students would be able to:

1. Identify and describe soft computing techniques and their roles in building intelligent Machines
2. Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems
3. Apply genetic algorithms to combinatorial optimization problems.
4. Evaluate and compare solutions by various soft computing approaches for a given problem.

Subject Code	SEMESTER - I	Scheme of studies per week			Credits
		L	T	P	
A2CNT204	**Data Storage Technologies and Networks**	**3**	**0**	**0**	**3**
	Total Lecture Hours: 45				

SYLLABUS

Unit 1:

Storage Media and Technologies – Magnetic, Optical and Semiconductor Media, Techniques for read/write Operations, Issues and Limitations.

Unit 2:

Usage and Access – Positioning in the Memory Hierarchy, Hardware and Software Design for Access, Performance issues.

Unit 3:

Large Storages – Hard Disks, Networked Attached Storage, Scalability issues, Networking issues. **Storage Architecture** - Storage Partitioning, Storage System Design, Caching, Legacy Systems.

Unit 4:

Storage Area Networks – Hardware and Software Components, Storage Clusters/Grids. **Storage QoS**–Performance, Reliability, and Security issues.

Unit 5:

Recent Trends related to Copy data management, Erasure coding, and Software defined storage appliances.

COURSE OUTCOMES

After completion of course, students would be:

1. Learn Storage System Architecture
2. Overview of Virtualization Technologies, Storage Area Network
3. Classify the applications as per their requirements and select relevant SAN solutions.

Text Books:

1. The Complete Guide to Data Storage Technologies for Network-centric ComputingPaperback– Import, Mar 1998 by Computer Technology Research Corporation
2. Data Storage Networking: Real World Skills for the CompTIA Storage by Nigel Poulton

Subject Code	SEMESTER - I	Scheme of studies per week			Credits
		L	T	P	
A2CNT205	**Network Perimeter Security**	**3**	**0**	**0**	**3**
	Total Lecture Hours: 45				

SYLLABUS

UNIT-1:
Perimeter security fundamentals, defense in depth.Packet filtering – Ports, Router as a packet filter, Access Lists – standard ACL, Extended ACL, dynamic packet filtering and reflexive ACL, stateful firewalls, stateful filtering and inspection. (chapters 2 and 3)

UNIT-2:
Proxy Firewalls: Proxying, advantages/disadvantages of proxy firewalls, web proxies, reverse and anonymizing proxies, tools for Proxying Firewalls as a policy, how to develop policy. (Chapters 4 and 5)

UNIT-3:
Router as a perimeter and security device, router hardening. (Chapter 6)
VPN: Basic VPN methodology and operations, advantages and disadvantages, IPSec, VPN setup, tunneling protocols used with VPN, enabling remote access connections with VPN, VPN design case study. (Chapter 7 and 16)

UNIT-4:
System Intrusion Detection and Prevention
Basics, roles of IDS in network defense, IDS sensor placement, case study. IPS – basics, Limitations, NIPS, HIPS, Honey pots and Honey nets(Chapter 8 and 11).

Host hardening:
Removing or disabling unnecessary programs, controlling user and privileges, maintaining host security logs, applying patches, etc.
Host Defense components:
Antivirus, host based firewalls, host based intrusion detection and prevention systems. (Chapter 9 and 10)

UNIT-5:
Designing a secure network perimeter- separating resources **–** security zones, common design elements, VLAN based separation.
Sample designs – telecommuter with a broadband connection, small business, small e-commerce site, complex e-commerce.
(Chapter 12, 13, 18).

TEXT BOOKS:

1. Inside Network Perimeter Security: S. Northcutt, L. Zeltser, Pearson education 2nd Edition.
2. Computer Network Security, Joseph MiggaKizza, Springerlink.

References:

1. WM Conklin, GregW hite, Principles of computer Security, TMH, 2nd edition, 2010.
2. InformationsecurityIlluminated,M.G.Soloman,MChapple,JonesandBartlett Publishers.
3. NetworkSecurity: The complete reference, Robert Bragg, Mark Rhodes, TMH
4. Computer Security, Dieter Gollmann, Second Edition, WileyIndia
5. TheHandbook ofData& Networks Security,Buchanan W.J., Springer

Course Outcomes:

At the end of the course the student shall :

1. Have the ability to explain the components of perimeter security.
2. Have the ability to write simple ACL's to implement simple packet filter firewalls.
3. Have the ability to understand types of firewalls.
4. Have the knowledge of VPN's.
5. Fully appreciate the role of IDS,IPSand host defensecomponents in perimeter security.
6. Grasp thesignificanceofseveral perimeter securitycomponents throughcasestudies.

Subject Code	SEMESTER - I	Scheme of studies per week			Credits
		L	T	P	
A2CNT206	**Sensor and Adhoc Networks**	**3**	**0**	**0**	**3**
	Total Lecture Hours: 45				

SYLLABUS

UNIT I

Introduction to Ad Hoc Networks

Characteristics of MANETs, Applications of MANETs and challenges of MANETs.

UNIT II

Routing in MANETs

Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms, Position based routing algorithms, Other routing algorithms.

UNIT III

Data Transmission

Broadcast storm problem, Broadcasting, Multicasting and Geocasting, TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

UNIT IV

Basics of Wireless, Sensors and Applications

Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer.

Data Retrieval in Sensor Networks

Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.

UNIT V

Security

Security in Ad Hoc networks, Key management, Secure routing, Cooperation in MANETs, Intrusion Detection systems.

TEXT BOOKS:

1. Ad Hoc and Sensor Networks – Theory and Applications, *Carlos CorderioDharmaP.Aggarwal,* World Scientific Publications, March 2006, ISBN – 981-256-681-3
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman)

COURSE OUTCOMES:

1. Have the knowledge and understanding of MANETS, characteristics, applications and challenges.
2. Have the ability to comprehend routing algorithms and their pros and cons.
3. Have the knowledge and understanding of wireless sensor networks, applications and dataretrieval.
4. Have the ability to understand various security mechanisms in Ad Hocnetworks.
5. Fully appreciate the role of Mobile Adhoc networks, and wireless sensor networks in real worldapplications.

Subject Code	SEMESTER - I	Scheme of studies per week			Credits
		L	T	P	
A2CNT105	**Research Methodologies and IPR**	**3**	**0**	**0**	**3**
	Total Lecture Hours: 45				

SYLLABUS

Unit – I

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

Unit – II

Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

Unit – III

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit – IV

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

Unit – V

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

COURSE OUTCOMES

1. Understand research problem formulation.
2. Analyze research related information
3. Follow research ethics
4. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
5. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
6. Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits

Reference:

1. Stuart Melville and Wayne Goddard, “Research methodology: an introduction for science & engineering students’”

2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”

3. Ranjit Kumar, 2 ndEdition, “Research Methodology: A Step by Step Guide for beginners”

4. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd,2007.

5. Mayall, “Industrial Design”, McGraw Hill, 1992.

6. Niebel, “Product Design”, McGraw Hill, 1974.

7. Asimov, “Introduction to Design”, Prentice Hall, 1962.

8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “ Intellectual Property in New Technological Age”, 2016.

9. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008.

	SEMESTER - I	L	T	P	C
A2CNL101	Computer Networks Engineering Lab	-	-	3	2
	Total Contact Hours – 42				

SYLLABUS

Lab Software: CISCO Packet Tracer
CCNA Exploration Material 1,2,3,4.

Lab Experiments:

1. Subnetting and Supernetting.
2. RIPv1
3. RIPv2
4. EIGRP
5. OSPF
6. Basic Switch Configuration.
7. VLANs
8. VTP
9. STP
10. Inter VLAN routing.
11. ACLs.

LAB OUTCOMES:

1. Have the ability to identify IPv4 addresses classes, perform sub-netting and Supernetting.
2. Have the ability to configure static routing in a router.
3. Have the ability to configure RIP, EIGRP.
4. Have the ability to configure OSPF routing.
5. Have the ability to configure switch for basic security and VLAN, VTP.
6. Have the ability to configure standard and extended ACL's

Fully appreciate the role of network engineer in establishing a small to medium sized networks.

A2CNL102	SEMESTER - I	L	T	P	C
	Ethical Hacking Lab	-	-	3	2
	Total Contact Hours – 42				

Experiments related to Penetration Testing (A Minimum of eight experiments has to be done by the students)

1. Port Scanning using nmap, Commands for different types of Scanning techniques, stealth scanning.
2. Sniffing networks and analysis of TCP/IP using Wireshark.
3. Cracking plain text passwords using wireshark.
4. Configuring IP Tables in Linux.
5. Intrusion Detection using Snort IDS.
6. Working with password crackers.
7. Finding vulnerabilities and exploitation using Metasploit Framework.
8. Understanding and Configuration of IPSec.
9. Understanding Buffer Overflow in C Programming under Linux environment.
10. Working with raw packet sniffer the TCPDUMP.
11. IP and MAC Spoofing techniques.
12. Cryptography using PGP and GNUPG

MBA

ACADEMIC REGULATIONS & CURRICULUM

MBA Programme

Applicable to the students admitted from the Academic year 2019-2020

MAHARAJ VIJAYARAM GAJAPATHI RAJ COLLEGE OF ENGINEERING

(Autonomous)

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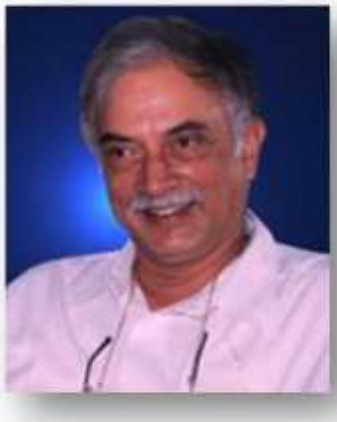
Re-Accredited by NBA, Re-accredited by NAAC with 'A' Grade,
Listed u/s 2(f) & 12(B) of UGC Act 1956.
Vijayaram Nagar Campus, Chintalavalasa,
Vizianagaram-535005, Andhra Pradesh

The visionaries

Late Dr. P V G Raju
Raja Saheb of Vizianagaram
Founder Chairman-MANSAS
Ex-Minister for Education and Health, Govt. of AP
Ex Member of Parliament

Late Dr. P. Anand Gajapathi Raju
Ex-Chairman-MANSAS
Ex-Minister for Education and Health
Govt. of AP
Ex Member of Parliament



P. Ashok Gajapathi Raju
Chairman-MANSAS
Ex-Union Minister for Civil Aviation,
Govt. of India
Ex-Minister for Finance, Govt. of AP

Vision

Maharaj Vijayaram Gajapathi Raj College of Engineering strives to become a centre par excellence for technical education where aspiring students can be transformed into skilled and well-rounded professionals with strong understanding of fundamentals, a flair for responsible innovation in engineering practical solutions applying the fundamentals, and confidence and poise to meet the challenges in their chosen professional spheres.

Mission

The management believes imparting quality education in an atmosphere that motivates learning as a social obligation which we owe to the students, their parents/guardians and society at large and hence the effort is to leave no stone unturned in providing the same with all sincerity. Towards that end, the management believes special focus has to be on the following areas:

M1: Have on-board staff with high quality experience and continuously updating themselves with latest research developments and sharing that knowledge with students.

M2: Having a well stream-lined teaching learning process that is continuously assessed for effectiveness and fine-tuned for improvement.

M3: Having state-of-the-art lab and general infrastructure that gives students the necessary tools and means to enhance their knowledge and understanding.

M4: Having a centralized department focused on improving placement opportunities for our students directly on campus and coordinating the training programs for students to Complement the curriculum and enhance their career opportunities.

M5: Having advanced research facilities and more importantly atmosphere to encourage students to pursue self-learning on advanced topics and conduct research.

ABOUT THE INSTITUTION:

Maharajah Alak Narayan Society of Arts and Science (MANSAS) is an Educational Trust founded by Dr. (late) P.V.G Raju, Raja Saheb of Vizianagaram in the hallowed memory of his father Maharajah Alak Narayan Gajapati with a view to confound socio-economic inequalities in the Vizianagaram principality executing a trust deed on 12-11-1958 duly established Maharajah's College and other educational institutions in and around Vizianagaram. The Trust is a charitable one published under Section 6 a (1) of A.P Charitable and Hindu Religious Institutions and Endowment Act 30 of 1987.

The object of the Trust is to manage the properties of educational institutions under it and to promote and advance the cause of education in general, besides awarding scholarships to deserving students enabling them to undergo special training in science and industries in and out of India. The Trust has made an uncompromising contribution to the nation by presenting the stalwarts.

Trust offers KG to PhD level education in Arts, Sciences, Law, Pharmacy, Humanities Education, Engineering and Management and presently houses 13 Educational Institutions. MVGR College of Engineering is one of the 13 Institutes.

Other Institutions under MANSAS

1. M.R. HIGH SCHOOL 1857
2. M.R COLLEGE **(NAAC ACCREDITED)** 1879
3. M.R. COLLEGE OF EDUCATION 1950
4. M.R. WOMENS COLLEGE **(NAAC ACCREDITED)** 1962
5. M.R. GIRLS HIGH SCHOOL 1974
6. M.R. MODEL HIGH SCHOOL 1974
7. M.R. ENGLISH MEDIUM SCHOOL 1979
8. M.R.V.R.G.R LAW COLLEGE 1987
9. M.R. P.G. COLLEGE **(NAAC ACCREDITED)** 1987
10. M.R.SCHOOL OF MANAGEMENT STUDIES 1994
11. M.R.V.R.G.R – II MEMORIAL JR. COLLEGE 1994
12. M.R. COLLEGE OF PHARMACY 2004

Maharaj Vijayaram Gajapathi Raj (MVGR) College of Engineering was established in the year 1997 by Maharaj Alak Narayan Society for Arts and Sciences (MANSAS) to impart quality technical education. The Institution is located in lush green, serene and pollution free environment spread over 60 acres of land in Chintalavalasa village situated in the outskirts of Vizianagaram, a fort city in the north coastal region of Andhra Pradesh.

Institution at a glance:

- MVGR is a 22 years old institution, established in 1997
- All eligible UG Programs (CHEMICAL, CIVIL, CSE, ECE, EEE, IT & MECHANICAL) were re-accredited by NBA.
- MBA program was also re-accredited by NBA.
- Had been re-accredited with Grade 'A' by NAAC of UGC
- Has Permanent affiliation with JN Technological University-Kakinada
- Listed under sections 2(f) & 12(b) of UGC act 1956.
- Approved by AICTE-New Delhi
- EIGHT departments are recognized as RESEARCH CENTERS by JNTU-K
- Granted Autonomy by UGC in 2015
- Campus of 60 acre
- Offering 7 UG and 5 M.Tech and MBA program
- About 250 faculty of which 84 Ph.D. Degree holders
- 83 Laboratories with an investment of about 13 crores
- Total built up area of about 7 Lakh sft
- About 42,000 volumes and Access to 8 international online journal packages like IEEE, SPRINGER, etc.
- 1420 Systems & 395 Mbps band width internet facility
- About Rs. 4 crore worth of on-going R&D projects
- Actively involved in civil engineering consultancy work as Third Party Quality Auditor for Vizianagaram Municipality
- WIPRO Recognized technology learning center and MISSION 10X partner institution
- Recognized National Instruments Academy for Training in LabView
- SIRO Recognition by DSIR
- Recognized PTC Centre of Excellence for Creo Training
- Identified by MSME as Business Incubation Centre
- APSSDC-Siemens Technical Skill Development Institute
- Recognized CMs SKILL EXCELLENCY CENTER (SEC)
- Micrsoft Ed-vantage Platinum Partner
- Institutional member of IUCEE
- Institutional Member of CII
- Member, Chamber of Commerce, Vizianagaram
- Green Campus award by Govt. of AP

MVGR College of Engineering is rated as one among the best engineering colleges in the state of Andhra Pradesh as it set up highest standards in all areas of curricular, co-curricular and extra-curricular activities and in students' placements. Based on industry and expert's feedback, the college is updating the curriculum from time to time. The college offers many value added add-on courses students and conducts training programs to meet the industries' requirements.

Academic Regulations for MBA Program

Applicable to the students admitted from the Academic year 2019-20 onwards.

1. PROGRAM STRUCTURE:

MBA:

S.No	Category	Credits
1	First year (I and II Semesters)	54 Credits of Core Courses
2	Second year (III and IV Semesters)	42 Credits of Electives
3	Internship/Field work	06 Credits
	Total	**102**

2. PROGRAM PATTERN

The program is for 2 academic years - 4 semesters.

3. AWARD OF DEGREE

A student will be declared eligible for the award of degree if he/she fulfills the following academic regulations.

- A student shall be declared eligible for the award of the degree, if he/she pursues a course of study for not less than Two academic years and not more than Four academic years.
- The student shall register for **102** credits and secure all **102** credits.
- Students who fail to complete Two Years Course of study within Four years shall forfeit their seat and their admission shall stand cancelled.

4. CERTIFICATION PROGRAMS:

S.No.	Dept	Name of the Program
1	MECH	Windchill 10.2 PDM by Adroitec Engineering Solutions Pvt. Ltd., Hyderabad
2	MECH	Creo 2.0 by PTC
3	MECH	Edgecam by Verosoft, UK
4	MECH	ANSYS Training and Certification by Mechanical Department
5	MECH	AUTOCAD Training and Certification by Mechanical Department
6	MECH	Catia by APSSDC-Dassault Systemes, CM's Center of Excellence
7	MECH	Delmia by APSSDC-Dassault Systemes, CM's Center of Excellence
8	MECH	Simulia by APSSDC-Dassault Systemes, CM's Center of Excellence
9	MECH	2-Wheeler Automobile Certification by APSSDC-SIEMENS
10	MECH	4-Wheeler Automobile Certification by APSSDC-SIEMENS
11	MECH	Welding Certification by APSSDC-SIEMENS
12	MECH	CNC Certification by APSSDC-SIEMENS
13	MECH	Commercial Electrical Certification by APSSDC-SIEMENS
14	MECH	Solid Edge Certification by APSSDC-SIEMENS
15	CHEM	Chemical Process Design and Simulation by Simtech Simulations, Hyderabad
16	ECE	Embedded Systems by ThinkLABS, Mumbai
17	ECE	Labview by National Instruments Systems India Pvt. Ltd.
18	ECE	Unified Technology Learning Program (UTLP) by Wipro Mission 10X
19	CSE, IT	PEGA by Virtusa Corporation
20	CSE, IT	Microsoft technologies by Microsoft Corp.
21	CSE, IT	Ethical Hacking by EC-Council Academia
22	CSE, IT	Java and C by Talent Sprint
23	CSE, IT	Network Analyst (CCNA) by Cisco Systems Inc
24	CSE, IT	Java Programming (OCJP) and DBMS by Oracle
25	EEE	PLC, Drives and Automation by Siemens
26	EEE	PLC by New Dawn Automation
27	EEE	Home Electrical Certification by APSSDC-SIEMENS
28	Civil	Remote Sensing and GIS by Indian Institute of Remote Sensing

a) The Institution shall offer the certification programs by itself or in collaboration with industry/such other Institutions deemed to have specialized expertise in the proposed area of training.

b) Only students of the Institution shall be eligible to register on payment of prescribed fee.

c) However, subject to availability of resources and the demand the Institution may offer the program to external candidates meeting the pre-qualification requirements and in the order of the merit.

d) The duration of the course and design of the content shall be done by the respective departments of the Institution by themselves or in collaboration with industry/such other institutions deemed to have specialized expertise in the proposed area of training.

e) If the duration of the course is less than or equal to 40 hours, it can be completed in one semester, otherwise, it can suitably distributed over a number of semesters.

f) Mere enrolment/registration for the program shall not entitle any claim for award of certificate.

g) A candidate shall be deemed eligible for the award of the certificate if he/she
- Attends at least 75% of scheduled training sessions
- Complies to all the requirements of submission of the assignments, presentations, seminars, projects, etc., and also appears for periodic tests.
- Shall attain minimum levels of performance in tests as prescribed.
- Shall remit such fee as deemed fit for the certification
- A candidate registered and failed to meet the requirements shall be permitted to repeat the said training one another time after remitting 25% of the fee fixed for the program as re-registration fee.

If the student is absent for the periodic tests, the test shall be re-conducted on payment of 10% of fee.

5. COURSES OFFERED:

Name of the Program	Degree
UG Programs (Engineering & Technology)	B.Tech. (Civil) B.Tech. (EEE) B.Tech. (Mech.) B.Tech. (ECE) B.Tech. (CSE) B.Tech. (CHEM) B.Tech. (IT)
PG Programs (Engineering & Technology)	M.Tech. (Structural Engineering) M.Tech. (Power Systems) M.Tech. (PDM) M.Tech. (VLSI) M.Tech. (CN&IS)
Other PG Programs	MBA
Research Programs	Ph.D in Civil, EEE, MECH, ECE, CSE, CHEM, MBA and MATHS

6. DISTRIBUTION AND WEIGHTAGE OF MARKS:

All Theory courses will have 5 units and assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end external examination.

Internal Assessment:

- **Subjective tests - 20 Marks**
- **Assignments/Mini Reports/Quiz - 20 Marks**

- Two subjective tests shall be conducted.
- Each subjective test shall be conducted for 90 Minutes and have 3 questions each for 7 marks (No choice) and the same shall be scaled down to 20 Marks.
- Average of two subjective tests shall be considered.
- Assignments/Mini reports/Quiz shall be assessed for 20 marks.

Semester End Assessment:

- External examination is for 60 marks (180 min). Question paper contains Part-A & Part-B. Part-A consists of 10 questions (2 questions from each unit) and each question carries 10 marks. Part-B consists of 1 question - Case study for 10 marks.
- Student shall answer 6 questions out of which 5 questions (1 question from each unit) from part - A and compulsory question (Case Study) from Part – B.

a) LABORATORY/PRACTICE:

All Laboratory/Practice courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for Semester End Examination.

Internal assessment: (40 Marks)

- Continuous assessment: :20 Marks
- Internal test: :20 Marks

Semester End Assessment: (60 Marks)

- Semester End Examination is for 60 marks (180 min) conducted and assessed by both external and internal examiners.
- Both internal and semester end examination shall include assessment of the student on
  - ❑ Knowledge of principles/concepts involved
  - ❑ Experimental design
  - ❑ Result interpretation and analysis
  - ❑ Experimental report

b) DRAWING/DESIGN/ESTIMATION:

These courses are assessed for 100 marks, of which, 40 marks for internal assessment and 60 marks for semester end examination.

- Continuous assessment for 20 marks for each unit finally averaged to 20 marks.
- Two internal assessment tests are conducted during the semester which shall be assessed for another 20 marks by taking the average.

PROJECT EVALUATION:

- A student shall take a project at the end of II semester.
- A Project Review Committee (PRC) is constituted at the end of the second semester.
- PRC includes HOD and two other senior faculties, one being the guide.
- To register for project work, a student shall complete all the course work requirements of I and II semesters.
- The progress of the work shall be periodically reviewed by PRC.
- The PRC shall authorize /approve change of guide/topic/title as deemed fit.
- A student shall submit Status Report in line with the recommended project calendar as approved by PRC.
- Project is evaluated for 200 marks at the end of IV semester.
- A student shall report to the guide/external supervisor and work under his supervision at least 30 hours per week for 6 weeks at the end of second semester.

Also, a student shall engage a minimum of 2 hours per week in III and IV semester in consolidating the data, report writing, results & analysis, conclusions etc. Evaluation shall comprise of internal and Semester End assessment.

Internal: 80

External: 120

- A project committee comprising of HoD, department Academic Coordinator, R&D member of the department, One senior faculty and guide shall review the progress once in four weeks.
- Internal evaluation shall be done by HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide for 80 marks.
- External evaluation shall be done by HoD, Guide/Internal Examiner and External Examiner for 120 marks.
- Assessment shall be on:
    - Problem definition
    - Literature review
    - Review on fundamental knowledge involved
    - Inter disciplinary aspect
    - Experimental/methodology design
    - Result analysis and interpretations
    - Report writing
    - Presentation
    - Viva-voce

7. ATTENDANCE REGULATIONS:

- A student shall be eligible to appear for end semester examinations, if he or she acquires a minimum of 75% of attendance in aggregate of all the subjects (Theory & Lab.) for the semester.
- Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the college academic committee.
- Shortage of attendance below 65% in aggregate of all the subjects (Theory & Lab) for the semester shall not be condoned.
- Detained student shall seek re- admission for that semester when offered within 4 weeks from the date of commencement of class work.

8. MINIMUM ACADEMIC REQUIREMENTS:

- A student is deemed to have satisfied the minimum academic requirements for a course on securing at least 24 marks out of 60 marks at semester end examination and overall minimum of 50 marks out of 100 marks including internal assessment.

9. GRADING SYSTEM:

Semester Grade Point Average (SGPA) for the current semester which is calculated on the basis of grade points obtained in all courses, except audit courses and courses in which satisfactory or course continuation has been awarded,

SGPA= Σ (course credits earned x Grade points) /
Σ (Total course credits in the semester.

CGPA= Σ (course credits earned x Grade points) up to successfully completed semesters / Σ(Total course credits up to successfully completed semesters)

The UGC recommends a 10-point grading system with the following letter grades as given below:

O	(Outstanding)	10
A+	(Excellent)	9
A	(Very Good)	8
B+	(Good)	7

B	(Above Average)	6
P	(Pass)	5
F	(Fail)	0
Ab	(Absent)	0

- iii. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade point	Credit Point (Credit x Grade)
Course 1	4	A	8	4 X 8 = 32
Course 2	4	B+	7	4 X 7 = 28
Course 3	4	B	6	4 X 6 = 24
Course 4	4	O	10	4 X 10 = 40
Course 5	4	A+	9	4 X 9 = 36
Course 6	4	B	6	4 X 6 = 24
Course 7	3	O	10	3 X 10 = 30
	27			**214**

Thus, **SGPA** =214/27 = 7.93

Illustration for CGPA

Semester 1	**Semester 2**	**Semester 3**	**Semester 4**
Credit : 27	Credit : 27	Credit : 21	Credit : 27
SGPA: 7.9	SGPA: 7.8	SGPA: 7.6	SGPA: 8.0

Thus, **CGPA** = $\frac{27 \times 7.9 + 27 \times 7.8 + 21 \times 7.6 + 27 \times 8.0}{\mathbf{102}}$ = **7.84**

10. ELIGIBILITY FOR AWARD OF DEGREE:

MBA:

A student shall be eligible for award of the degree if he/she fulfills the following conditions:

1) Successfully completes all the courses prescribed for the Program.
2) CGPA greater than or equal to 5.5(Minimum requirement for Pass),

11. AWARD OF CLASS:

Candidates who are eligible for the award of MBA Degree shall be placed in one of the following Classes based on CGPA.

Class	CGPA
Distinction	≥ 7.5
First Class	≥ 6.5
Pass Class	≥ 5.5

12. INSTRUCTION DAYS

A semester shall have a minimum of 90 clear instruction days.

13. TRANSFERS FROM OTHER INSTITUTIONS SHALL NOT BE PERMITTED.

14. SUPPLEMENTARY EXAMINATIONS

Supplementary examinations shall be conducted along with regular examinations.

15. WITHHOLDING OF RESULTS

The result of a student shall be withheld

- If the student has not paid the dues, if any, to the institution.
- If any case of pending disciplinary action
- Involvement in any sort of malpractices etc.
- Involvement in ragging.

16. TRANSITORY REGULATIONS

A Candidate shall be readmitted from University regulations to A1 regulations or from A1 regulations to A2 regulations as per the guide lines of JNTUK.

17. AMENDMENTS TO REGULATIONS:

The Academic Council of MVGR College of Engineering (Autonomous) reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations, and/ or Syllabi or any other such matter relating to the requirements of the program which are compatible to the contemporary/emerging trends effectively meeting the needs of society/industry/stake holding groups.

18. Regulations for MALPRACTICES during the conduct of examinations

	Nature of Malpractices/Improper conduct	Punishment
1 (a)	If the candidate possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only. *
(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. *
2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled. *
3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of

		seat. If the imposter is an outsider/candidate not on rolls, he will be handed over to the police and a case is registered against him. *
4	If the candidate mishandles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. Also if the answer script is mutilated / damaged disturbing the shape, of the script, answers, the bar code intentionally.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. He shall be debarred from class work and all examinations and be allowed to reregistered for the next subsequent odd or even semester only. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.*
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	The same should be brought to the notice of CE who in turn in consultation with malpractice committee makes decision for cancellation of the performance in that subject. *
6	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. *
7	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof	Expulsion from the examination hall and cancellation of

	inside or outside the examination hall.	performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. *
8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. *
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. *
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including

		practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. *
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.*

*

1. General :

- Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
- The academic regulation should be read as a whole for the purpose of any interpretation.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

⇨ **Ragging within or outside any educational institution is prohibited.**

⇨ **Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student**

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	Rs. 2,000/-

Wrongfully restraining or confining or causing hurt	 2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	 10 Months	+	Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE MVGR A RAGGING FREE CAMPUS

Ragging

ABSOLUTELY NO TO RAGGING

1. **Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.**
2. **Ragging entails heavy fines and/or imprisonment.**
3. **Ragging invokes suspension and dismissal from the College.**
4. **Outsiders are prohibited from entering the College and Hostel without permission.**
5. **Girl students must be in their hostel rooms by 7.00 p.m.**
6. **All the students must carry their Identity Cards and show them when demanded**
7. **The Principal and the Wardens may visit the Hostels and inspect the rooms any time.**

MBA COURSE STRUCTURE (A2 REGULATIONS)

Semester - I						
S. No	**Subject Code**	**Subject**	**L**	**T**	**P**	**Credits**
1	A2MBT301	Indian Ethos and Corporate Governance	3	1		4
2	A2MBT302	Business Economics	3	1		4
3	A2MBT303	Management Theory and Organizational Behavior	3	1		4
4	A2MBT304	Indian Economy and Business Environment	3	1		4
5	A2MBT305	Financial Statements, Analysis and Reporting	3	1		4
6	A2MBT306	Business Research Methods	3	1		4
7	A2MBL301	Business Communication (Lab)	2		2	3
Total Credits						**27**
Semester - II						
S. No	**Subject Code**	**Subject**	**L**	**T**	**P**	**Credits**
1	A2MBT307	Entrepreneurship	3	1		4
2	A2MBT308	Marketing Management	3	1		4
3	A2MBT309	Financial Management	3	1		4
4	A2MBT310	Human Resource Management	3	1		4
5	A2MBT311	Strategic Management	3	1		4
6	A2MBT312	Operations Management	3	1		4
7	A2MBL302	Computer Applications for Business (Lab)	2		2	3
Total Credits						**27**
Semester – III						
S. No	**Subject Code**	**Subject**	**L**	**T**	**P**	**Credits**
1	A2MBT4XX	Functional Area 1- Core Elective-1	3			3
2	A2MBT4XX	Core Elective-2	3			3
3	A2MBT4XX	Core Elective-3	3			3
4	A2MBT4XX	Functional Area 2- Core Elective-1	3			3
5	A2MBT4XX	Core Elective-2	3			3
6	A2MBT4XX	Core Elective-3	3			3
7	A2MBT5XX	Open Elective-1	3			3
Total Credits						**21**

Semester - IV						
S. No	**Subject Code**	**Subject**	**L**	**T**	**P**	**Credits**
1	A2MBT4XX	Functional Area 1- Core Elective-4	3			3
2	A2MBT4XX	Core Elective-5	3			3
3	A2MBT4XX	Functional Area 2- Core Elective-4	3			3
4	A2MBT4XX	Core Elective-5	3			3
5	A2MBT5XX	Open Elective-2	3			3
6	A2MBT5XX	Open Elective-3	3			3
7	A2MBT5XX	Open Elective-4	3			3
8	A2MBP601	Project Work & Viva-Voce				6
Total Credits						**27**

L-Lecture Hours T- Tutorial P-Practical Total Program Credits 102

CORE COURSES		
S. No	**Subject Code**	**Subject**
1	A2MBT301	Indian Ethos and Corporate Governance
2	A2MBT302	Business Economics
3	A2MBT303	Management Theory and Organizational Behavior
4	A2MBT304	Indian Economy and Business Environment
5	A2MBT305	Financial Statements, Analysis and Reporting
6	A2MBT306	Business Research Methods
7	A2MBT307	Entrepreneurship
8	A2MBT308	Marketing Management
9	A2MBT309	Financial Management
10	A2MBT310	Human Resource Management
11	A2MBT311	Strategic Management
12	A2MBT312	Operations Management
13	A2MBL301	Business Communication (Lab)
14	A2MBL302	Computer Applications for Business (Lab)

CORE ELECTIVIES

The Dept. has been offering three functional areas of core electives, the student has to opt any two of such areas as dual specialisation, say Functional Area I and Functional Area II. Further, each functional area consists three clusters, each cluster consists five courses, out of which one cluster is to be chosen in that area.

Functional Area (Marketing)		
S. No	**Subject Code**	**Subject**
1	A2MBT401	Consumer Behaviour
2	A2MBT402	Retail Management
3	A2MBT403	Services Marketing
4	A2MBT404	Sales and Distribution Management
5	A2MBT405	B2B Marketing
6	A2MBT406	Digital and Social Media Marketing
7	A2MBT407	Integrated Marketing Communications
8	A2MBT408	Product and Brand Management
9	A2MBT409	BoP Marketing

Cluster I:

1. Consumer Behaviour
2. Retail Management
3. Services Marketing
4. Sales and Distribution Management
5. B2B Marketing

Cluster II:

1. Consumer Behaviour
2. Retail Management
3. Services Marketing
4. Digital and Social Media Marketing
5. Integrated Marketing Communications

Cluster III:

1. Consumer Behaviour
2. Retail Management
3. Services Marketing
4. Product and Brand Management
5. BoP Marketing

Functional Area (Finance)		
S. No	**Subject Code**	**Subject**
1	A2MBT410	Financial Institutions-Markets and Services
2	A2MBT411	Security Analysis and Portfolio Management
3	A2MBT412	International Finance
4	A2MBT413	Financial Planning and Wealth Management
5	A2MBT414	Derivatives Market
6	A2MBT415	Corporate Valuation and Mergers
7	A2MBT416	Banking and Insurance
8	A2MBT417	Cost and Management Accounting
9	A2MBT418	Working Capital Management

Cluster I:

1. Financial Institutions-Markets and Services
2. Security Analysis and Portfolio Management
3. International Finance
4. Financial Planning and Wealth Management
5. Derivatives Market

Cluster II:

1. Financial Institutions-Markets and Services
2. Security Analysis and Portfolio Management
3. International Finance
4. Corporate Valuation and Mergers
5. Banking and Insurance

Cluster III:

1. Financial Institutions-Markets and Services
2. Security Analysis and Portfolio Management
3. International Finance
4. Cost and Management Accounting
5. Working Capital Management

Functional Area (HRM)		
S. No	**Subject Code**	**Subject**
1	A2MBT419	Employee Relations
2	A2MBT420	Compensation and Payroll Management
3	A2MBT421	Managing Change
4	A2MBT422	Human Resource Metrics and Analytics
5	A2MBT423	Artificial Intelligence in HRM
6	A2MBT424	Talent Acquisition and Retention Management
7	A2MBT425	Strategic HRM
8	A2MBT426	Performance Management Systems
9	A2MBT427	Learning and Development

Cluster I:

1. Employee Relations
2. Compensation and Payroll Management
3. Managing Change
4. Human Resource Metrics and Analytics
5. Artificial Intelligence in HRM

Cluster II:

1. Employee Relations
2. Compensation and Payroll Management
3. Managing Change
4. Talent Acquisition and Retention Management
5. Strategic HRM

Cluster III:

1. Employee Relations
2. Compensation and Payroll Management
3. Managing Change
4. Performance Management Systems
5. Learning and Development

OPEN ELECTIVES

The student has to opt any four out of nine open electives offered which are to be studied during Semester III and Semester IV.

S. No	Subject Code	Subject
1	A2MBT501	Indian Models in Entrepreneurship
2	A2MBT502	International Trade Laws
3	A2MBT503	Planning, Structuring and Financing Small Business
4	A2MBT504	Logistic and Supply Chain Management
5	A2MBT505	E-Retailing
6	A2MBT506	Tourism and Hospitality Management
7	A2MBT507	Treasury Management
8	A2MBT508	Rural and Urban Infrastructure Management
9	A2MBT509	Block chain Technology

PROEJCTS

S.No	Subject Code	Subject
1	A2MBP601	Project Work & Viva-Voce

A2MBT301	SEMESTER - I	L	T	P	C
	INDIAN ETHOS AND CORPORATE GOVERNANCE	3	1	-	4
	Total Contact Hours – 45				

COURSE OBJECTIVES	
COBJ1	To identify the role of ethos for smooth functioning of Business.
COBJ2	To outline the ethics of Business functional areas to protect against frauds.
COBJ3	To summarize the concept of Corporate Social Responsibility for Business Sustainability.
COBJ4	To analyze the significance of Corporate Governance codes & Standards in the scenario of Indian Business.
COBJ5	To explain the role of Directors, Auditors, and Shareholders towards Corporate Governance.

SYLLABUS

UNIT-I INDIAN ETHOS: History & Relevance- Elements of Ethos- Ethos vs Ethics vs Management- Work Ethos for Indian Managers- Laws of karma- Value Based Management- Secular v/s Spiritual Values- Skill -Value Matrix- Dual theory of stress

UNIT-II BUSINESS ETHICS: Ethical principles in business- Theories of Business Ethics- Kohlberg's six stages of Moral Development- Managing Ethical Dilemma in Finance, Marketing, HRM and International Business-Ethical Decision Making-Developing Codes of Ethics

UNIT-III CORPORATE SOCIAL RESPONSIBILITY: Objectives- Evolution- Need for CSR- Strategies for CSR-Challenges and implementation- Triple Bottom Line (TBL)- Corporate Sustainability Reporting- Promoting Sustainability Development Goals(SDG's)

UNIT-IV CORPORATE GOVERNANCE: An overview –Codes & standards of Corporate Governance – Indian model of Governance –Landmarks in emergence of corporate governance in India– Organisation for Economic Cooperation and Development (OECD) principles – Sarbanes Oxley (SOX) Act 2002

UNIT-V SHAREHOLDERS & BOARDS OF DIRECTORS: Governance issues relating to Board of Directors – Duties and Responsibilities of Auditors –Shareholders Activism - Proxy fights-Hedge fund activism - Role of Media- Environmental Concern- -Role of Whistle Blowers

NOTE: Relevant cases have to be discussed in each unit

REFERENCE BOOKS:

1. R Nandagopal and Ajith Rn, "Indian Ethos and Values in Management", Tata Mc Graw Hill Education, 2010
2. Jitatmananda Swami, Indian Ethos for Management, Rajkot, Ramakrishna Ashram, 1996.
3. Brately Peter, "The Essence of Business Ethics", New Delhi, Prentice Hall of India, 1997.
4. Murthy, C.S.V, "Business Ethics", Himalaya Publishing House, Mumbai 2009
5. B.N Mandal, Corporate Social Responsibility in India, Global vision publishing house, 2012.
6. A.C.Fernando: "Business Ethics and Corporate Governance 2e", Pearson Publishers, New Delhi, 2012.
7. S.K.Mandal , "Ethics in Business and Corporate Governance 2e", Mc Graw Hill, 2017

COURSE OUTCOMES: At the end of this course, the students will be able to	
CO1	Describe an ethical business and its nature with reference to Indian Companies.
CO2	Demonstrate ethical insights of HR, finance and Marketing for a better Business.
CO3	Interpret CSR strategies towards Corporate Sustainability Reporting.
CO4	Examine Indian model of Corporate Governance along with codes and standards.
CO5	Summarize the role of Directors, Auditors and shareholders.

CO – PO MAPPING:

Course Title:		INDIAN ETHOS AND CORPORATE GOVERNANCE				
Course Code:		A2MBT301				
Course Designed by:		Department of Management Studies				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1		3				
CO2		3				
CO3		3	2			
CO4	2					
CO5						2
Overall	2	3	2			2

Course designed by	Department of Management Studies
Approval	Approved by: Meeting of Board of Studies held on 08.07.2019
	Ratified by: 5th Meeting of Academic Council, 13.07.2019

A2MBT302	SEMESTER - I	L	T	P	C
	BUSINESS ECONOMICS	3	1	-	4
	Total Contact Hours – 45				

COURSE OBJECTIVES	
COBJ1	To make the student understand relevance and importance of economics in business management
COBJ2	To enable the student make critical decision making process
COBJ3	To make the student understand dynamic macro-economic indicators influencing the business.

SYLLABUS

UNIT–I ECONOMICS: Definition –Nature –Scope –Origin – Micro Vs Macroeconomics – The Role of Managerial Economist – Relationship of Business Economics with other managerial functions – Basic economic Concepts: Costs, capital, price,etc.

UNIT–II DEMAND & SUPPLY ANALYSIS: Law of demand – Demand determinants – Law of diminishing marginal utility – Elasticity of demand, types and significance – Law of supply – Supply Determinants – Elasticity of Supply – Demand and supply curves – Production Function – IsoQuant – IsoCost – Least Cost Combination of Inputs.

UNIT–III PRICING ANALYSIS: Types of Markets: Price & Output determination in Perfect competition, Monopoly, Monopolistic competition and Oligopoly – Pricing methods – Price Discrimination – CVP and Break-Even analysis.

UNIT–IV MACROECONOMIC FUNCTIONS: Consumption function – Investment function, Functions of Money – Demand for money – Supply of Money – Money supply measures: M1, M2, M3, M4 – Control of Money Supply and Open market operations.

UNIT–V MACRO ECONOMIC INDICATORS: Aggregate demand and supply –National Income: GDP, NNP, Per Capita Income – Inflation and Deflation – Employment – Repo Rates – Capital formation – Foreign exchange rates – Foreign Direct Investment (FDI).

NOTE: Relevant cases have to be discussed in each unit

REFERENCE BOOKS:

- William F.Samuelson, Stephen G.Marks, Managerial Economics, Wiley, 6th edition.
- Paul A.Samuelson ,William D Nordhaus, Sudip Chaudhuri and Anindya sen, Douglas A Lind, William G Marchal and Samuel A Wathan, Statistical Techniques in Business and Economics, 16th Edition, McGraw-Hill Education.
- Edward Shapiro, Macro Economic Analysis, 5th Edition, Galgotia Publications.
- M L Jhingan, Macro Economic Theory, Vrinda Publications, 13th Edition

- Economics, McGraw Hill Education, 19th edition, 2010.
- R.Glenn hubbard, Anthony Patrick O'Brien, Macroeconomics ,Pearson 7th edition ,2018
- Raymond A Barnett, Michael R Ziegler and Carl E Byleen, Calculus for business economics, Pearson,
- Roger Perman and John Scouller, Business Economics, Oxford University Press.

JOURNALS:

- The Indian Economic journal, Sage Publications
- The Economic Journal, Oxford University Press
- Journal of economics and Business, Elsevier
- Journal of Economics, Springer

COURSE OUTCOMES: At the end of this course, the students will be able to	
CO1	Integrate economics framework with business management.
CO2	Outline the practical issues of demand and supply conditions for managerial decisions.
CO3	Analyze the competition levels and adopt pricing strategies and other decisions.
CO4	Apply business decisions for growth and expansion by understanding the various economic functions.
CO5	Understand the impact of macroeconomic indicators.

CO – PO MAPPING:

Course Title:	BUSINESS ECONOMICS					
Course Code:	A2MBT302					
Course Designed by:	Department of Management Studies					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	3		2			
CO2	2		3	2		
CO3			3	2		
CO4	3		2	1		
CO5	3		1	1		
Overall	3		2	2		

Course designed by	Department of Management Studies
Approval	Approved by: Meeting of Board of Studies held on 08.07.2019
	Ratified by: 5th Meeting of Academic Council, 13.07.2019

A2MBT303	SEMESTER - I	L	T	P	C
	MANAGEMENT THEORY AND ORGANIZATIONAL BEHAVIOR	3	1	-	4
	Total Contact Hours – 45				

COURSE OBJECTIVES	
COBJ1	To familiarize the students with the basic concepts of management including the contributions of various managerial scientists
COBJ2	To introduce the functions of management and the way it is performed in the organizations
COBJ3	To make the students understand the factors affecting the individual behaviour and its impact on organizational behaviour

SYLLABUS

UNIT-I MANAGEMENT: Definitions, managerial roles and functions– Evolution of Management thought: Scientific management approach- administrative management approach- Human Relations Approach- Systems approach and Situational Approach.

UNIT-II PLANNING: The Planning Process- Organizing: Span of management- Organizational structure–delegation of authority – Leading: Approaches to leadership – Controlling Process and techniques.

UNIT-III ORGANIZATIONAL BEHAVIOR: Nature and scope – Perception: Importance and process – Attitudes: Components, Types, Functions – Personality: Determinants, Big Five Personality dimensions.

UNIT-IV MOTIVATION: Definition. Theories on motivation: Abraham Maslow's Hierarchy of needs theory- Herzberg Two Factor Theory - Interpersonal Behaviour - Group dynamics – group formation and development -conflict management.

UNIT-V ORGANIZATIONAL CULTURE: Definition – creating organizational culture- approaches to organizational culture – learning of organizational culture

NOTE: Relevant cases have to be discussed in each unit

REFERENCE BOOKS:

1. Stoner, J. A. F., & Freeman, R. E.). *Management*. London: Prentice-Hall International.
2. Griffin, Moorhead: "Managing Organisational Behaviour", Cengage Learning, New Delhi.2013
3. William, Tripathy: "**MGMT (including instructor recourses)**", Cengage Learning, New Delhi, 2013
4. Jerald Greenberg and Robert A Baron: "***Behavior in Organizations***", PHI Learning Private Limited, New Delhi, 2009
5. Mullins, Laurie: "**Management and Organisational Behaviour**", Pearson Education, New Delhi, 2013
6. Jennifer M.George and Gareth R. Jones: "***Understanding and Managing Organizational Behavior***", Pearson Education, New Delhi, 2009

7. Meenakshi Gupta: "***Principles of Management***", PHI Private Limited, New Delhi, 2009.
8. J S Chandan: "***Management Theory and Practice***", Vikas Publishing House Limited, 2009
9. Anil Bhat, Arya Kumar: "***Management***", Oxford University, New Delhi, 2008.
10. Jai B.P.Sinha: "***Culture and Organizational Behavior***", Sage Publication India Private Limited, New Delhi, 2008.
11. K.Aswathappa: "**Organizational Behavior-Text, Cases and Games**", Himalaya Publishing House, New Delhi, 2008
12. Gupta R S, Sharma B D Bhalla N S: "**Principles and Practice of Management**", Kalyani Publications, Hyderabad, 2008.
13. PareekUdai: "***Understanding Organizational Behavior***", Oxford University Press, New Delhi, 2007
14. Dr.P.Subba Rao and Prof. N.Sambasiva Rao:"**Management and Organizational Behaviour - (Text and Cases)**", Himalaya Publishing House, Mumbai

COURSE OUTCOMES: At the end of this course, the students will be able to	
CO1	Explain the transition process of management thought from traditional period to modern approaches
CO2	Transfer the understanding of functions of management into a practical situation
CO3	Identify and analyze the factors affecting individual behaviour
CO4	Compare and contrast various theories on motivation and develop strategies for resolving group conflict.
CO5	Analyze organizational culture and learning of organizational culture in organization.

CO – PO MAPPING:

Course Title:	MANAGEMENT THEORY AND ORGANIZATIONAL BEHAVIOR					
Course Code:	A2MBT303					
Course Designed by:	Department of Management Studies					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	3					
CO2			3		2	2
CO3				2		2
CO4					2	3
CO5	2	2				2
Overall	3	2	3	2	2	2

Course designed by	Department of Management Studies
Approval	Approved by: Meeting of Board of Studies held on 08.07.2019
	Ratified by: 5th Meeting of Academic Council, 13.07.2019

A2MBT304	SEMESTER - I	L	T	P	C
	INDIAN ECONOMY AND BUSINESS ENVIRONMENT	3	1	-	4
	Total Contact Hours – 45				

COURSE OBJECTIVES	
COBJ1	To explain the evolution of economic system in India with recent reforms
COBJ2	To outline various aspects of economic, social, government, political and cultural environment of India and their impact on Indian business.
COBJ3	To disseminate the students with critical issues of international business.

SYLLABUS

UNIT-I FEATURES OF INDIAN ECONOMY: Economic Systems – Planning commission to NITI Ayog – Role of agriculture, manufacturing and services in economic growth – Economic indicators – Economic reforms.

UNIT-II BUSINESS ENVIRONMENT: Meaning, Importance, Factors influencing business environment, Industrial Policies, Role of public and private sector, Industrial sickness – Disinvestment.

UNIT-III POLICIES AND REGULATORY BODIES: Monetary Policy – Importance – objectives-Significance – Instruments – Fiscal Policy – Importance – objectives-Significance – Instruments – Critical analysis of the recent fiscal policy of Government of India

UNIT-IV TRADE POLICY: Nature – Magnitude and direction of Indian international trade – problems – bilateral and multilateral trade agreements. Balance of Payments – Structure and components – Disequilibrium in BOP-Correction measures – CAD and its impact on economy

UNIT-V INTERNATIONAL BUSINESS ENVIRONMENT: Nature – significance– challenges and mechanisms. WTO – Agreements in the Uruguay round including TRIPS, TRIMS and GATS – Disputes settlement mechanism – Dumping and antidumping measures.

NOTE: Relevant cases have to be discussed in each unit

REFERENCE BOOKS:

- Dutt, R., & Sundaram, K. P. M. (2011). Indian Economy, S Chand & Co. *New Delhi*.
- Misra, S. K., & Puri, V. K. (2011). *Indian economy* (p. 174). Himalaya Publishing House.
- Aswathappa, K. (2009). *Essentials of business environment*. Himalaya Publishing House.
- Cherunilam, F. (2009). *Business environment* (p. 642). Himalaya Publishing House.
- Joshi, L., Joshi, V., Little, I. M. D., & Little, I. M. D. (1996). *India's economic reforms, 1991-2001*. Oxford University Press.

JOURNALS:

- Kennerley, M., & Neely, A. (2003). Measuring performance in a changing business environment. *International Journal of Operations & Production Management*, *23*(2), 213-229.
- Amankwah-Amoah, J., & Wang, X. (2019). Opening editorial: contemporary business risks: an overview and new research agenda.
- Srivastava, N. (2019). Digital Financial Services: Challenges and Prospects for Liberalized and Globalized Indian Economy. *Available at SSRN 3309294*.
- Shiva, V., & Bedi, G. (2002). *Sustainable agriculture and food security: the impact of globalisation*. Sage Publications India Pvt Ltd.

WEB LECTURES:

- https://www.youtube.com/watch?v=pqQGm_CGrSE
- https://nptel.ac.in/courses/110105038/10
- https://nptel.ac.in/courses/110105079/54
- https://nptel.ac.in/courses/110105038/7

COURSE OUTCOMES: At the end of this course, the students will be able to	
CO1	Understand the economic systems and major economic reforms in India
CO2	Analyze the environment of a business and understand the cause of industrial sickness
CO3	Evaluate the monetary policy and fiscal policy of the country
CO4	Discuss various elements of Indian Trade policy
CO5	Explain the mechanisms and policies governing the international business environment

CO – PO MAPPING:

Course Title:	INDIAN ECONOMY AND BUSINESS ENVIRONMENT					
Course Code:	A2MBT304					
Course Designed by:	Department of Management Studies					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	3					
CO2	3		2			
CO3	2		2			
CO4	2			3		
CO5	3		2	3		
Overall	3		2	3		

Course designed by	Department of Management Studies
Approval	Approved by: Meeting of Board of Studies held on 08.07.2019
	Ratified by: 5th Meeting of Academic Council, 13.07.2019

A2MBT305	SEMESTER - I	L	T	P	C
	FINANCIAL STATEMENTS, ANALYSIS AND REPORTING	3	1	-	4
	Total Contact Hours – 45				

COURSE OBJECTIVES	
COBJ1	To introduce students to the accounting principles, concepts and conventions
COBJ2	To explain the accounting process and prepare final accounts.
COBJ3	To make students aware the corporate firm and its capital formation.
COBJ4	To enable the students towards final accounts analysis and reporting.

SYLLABUS

UNIT-I INTRODUCTION TO ACCOUNTING: Importance, Objectives and Principles, Accounting Concepts, Conventions and The Generally Accepted Accounting Principles (GAAP)

UNIT-II THE ACCOUNTING PROCESS: Overview of the Accounting cycle- Journal, ledger, Trial Balance, Final Accounts with simple adjustments (Problems on Preparation of Final accounts with simple adjustments)

UNIT-III SOURCES OF CAPITAL: Introduction to company form of organization-sources of long term capital and their features- Equity shares, Preference shares, Debentures and sources of short term Working capital.

UNIT-IV FINANCIAL STATEMENTS ANALYSIS: Analysis and Interpretation of financial statements of a company – tools of financial analysis- comparative statements common size statement, Liquidity, leverage, solvency and profitability ratios. (Problems on Ratio analysis, comparative and common size statement)

UNIT-V FINANCIAL REPORTING: Meaning and Objectives of Financial Reporting, Types and Qualitative characteristics of reporting, International Financial Reporting Standards (IFRS)-Common Rules

Indian Reporting practices of selected industry to be discussed

REFERENCE BOOKS:

1. Shankarnarayana, Ramanath: "**Financial Accounting for Management**", Cengage Learning, New Delhi
2. R.L.Gupta, Radhaswamy : Financial accounting.. S.Chand&Co., New delhi., 2000.
3. S.N.Maheashwari and S.K.Maheshwari, "**Financial Accounting**",
4. Vikas publishing House, New Delhi,2013
5. JawaharLal: **for management**", Himalaya Publishing house, New Delhi,; 2012.
6. Paresh Shah: "**Financial accounting for management**", Oxford University press, New Delhi

WEB LINKS: https// www.ifrs.org

www.cfainstitute .org/Reporting frequency

COURSE OUTCOMES: At the end of this course, the students will be able to	
CO1	Understand basic principles, concepts and conventions of accounting.
CO2	Construct final accounts for a business firm through formal accounting process.
CO3	Identify and appraise various sources of capital and their features.
CO4	Analyze financial statements and judge the financial performance of a firm
CO5	Understand the financial reporting and its types

CO – PO MAPPING:

Course Title:	FINANCIAL STATEMENTS, ANALYSIS AND REPORTING					
Course Code:	A2MBT305					
Course Designed by:	Department of Management Studies					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	3	1		2		
CO2	1	2	3			
CO3	2			2		
CO4	1		3			
CO5			2		3	
Overall	2	1	3	2	3	

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Course designed by	Department of Management Studies
Approval	Approved by: Meeting of Board of Studies held on 08.07.2019
	Ratified by: 5th Meeting of Academic Council, 13.07.2019

A2MBT306	SEMESTER - I	L	T	P	C
	BUSINESS RESEARCH METHODS	3	1	-	4
	Total Contact Hours – 45				

COURSE OBJECTIVES	
COBJ1	To explain the fundamentals of statistics
COBJ2	To demonstrate how to work with different types of data and how to design different data collection techniques
COBJ3	Enable students for using the computer program MS Excel & SPSS apply basic statistical techniques and methods for grouping, tabular and graphical display, analysis and interpretation of statistical data

SYLLABUS

UNIT-I BUSINESS STATISTICS: Importance of Statistics in modern business environment – Scope and Applications of Statistics – Characteristics of Statistics – Functions of Statistics – Limitations of Statistics – Statistical Softwares.

UNIT-II DESCRIPTIVE AND INFERENTIAL STATISTICS: Measures of central tendency – Dispersion – Correlation – Regression – Moving Averages. (Business research applications)

UNIT-III BUSINESS RESEARCH: Definition – Nature and Scope of Business Research – Types of Research – The Research Process – Sampling design – sampling procedures – Random Vs. Non-random sampling techniques – determination of sample size.

UNIT-IV DATA COLLECTION: Primary data – survey research – Interviews – questionnaires – Designing of Questionnaire – Nominal Scale – Ordinal Scale – Interval Scale – Ratio Scale – Guttman Scale – Likert Scale – Schematic Differential Scale – Internet surveys – pretesting observation methods – Secondary data, tools and techniques of data collection

UNIT-V TESTING OF HYPOTHESIS: Tests of Hypothesis – Introduction to Null hypothesis vs alternative hypothesis – parametric vs. non-parametric tests – Type I & II errors – Parametric test Non Parametric test – T-Test – Chi-Square Test, Report writing

NOTE: Relevant cases have to be discussed in each unit

REFERENCE BOOKS:

1. Kothari, C. R. (2004). Research methodology: Methods and techniques. Revised. *New Age International (P) Limited, Publishers*, *4835*, 24.
2. Zikmund, W. G., Babin, B. J., Carr, J. C., & Griffin, M. (2013). *Business research methods*. Nelson Education.
3. Blumberg, B., Cooper, D. R., & Schindler, P. S. (2008). *Business research methods* (Vol. 2). London: McGraw-Hill Higher Education.
4. Krishnaswamy, K. N., Sivakumar, A. I., & Mathirajan, M. (2006). *Management research methodology: integration of principles, methods and techniques*. Pearson Education India.
5. Kumar, R. (2019). *Research methodology: A step-by-step guide for beginners*. Sage Publications Limited.

JOURNALS:

- Selected articles from Journals available in the library for discussion

WEB SOURCES:

- https://nptel.ac.in/courses/121106007/
- https://nptelmooc2013.appspot.com/noc16_ge02
- https://freevideolectures.com/course/3039/population-and-society/7
- https://www.youtube.com/watch?v=EVcPmmfK1Do

COURSE OUTCOMES: At the end of this course, the students will be able to	
CO1	Understand basic statics and tools for collecting data and designing databases
CO2	Learn how to effectively leverage data for strategic decision making
CO3	Conduct and interpret a variety of hypothesis tests to aid decision making in a business context
CO4	Critically evaluate statistical results
CO5	Formulate and test hypothesis

CO – PO MAPPING:

Course Title:		BUSINESS RESEARCH METHODS				
Course Code:		A2MBT306				
Course Designed by:		Department of Management Studies				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	1		3			
CO2	2		3			
CO3	1		3			
CO4	2		3			
CO5	2		3			
Overall	2		3			

Course designed by	Department of Management Studies
Approval	Approved by: Meeting of Board of Studies held on 08.07.2019
	Ratified by: 5th Meeting of Academic Council, 13.07.2019

A2MBL301	SEMESTER - I	L	T	P	C
	BUSINESS COMMUNICATION-LAB	2	2	-	3
	Total Contact Hours – 45				

COURSE OBJECTIVES	
COBJ1	To introduce the students to the fundamentals of communication and the way it is applied in organizational settings.
COBJ2	To expose the students to the techniques of effective writing, reading and listening skills.
COBJ3	To explain the process of report writing and its quality

SYLLABUS

UNIT	LESSON/TOPIC
I	Orientation **Fundamentals of Communication** • Introduction • Definition of Communication • Process of Communication • Features of Successful Professional Communication • Different Forms of Communication. • Barriers of Communication • **Corporate communication** Definition, Scope, importance & Components of Corporate communication, Professional communicator responsibilities, Corporate communication & Public Relation, Role of social media in communication.
II	**Organizational Communication**. • Small group communication • Communicating with employees. • In company communication Barriers & Facilitations. • Meetings and committees • Meetings • Chairing, setting the agenda, controlling the conversation • Participating, turn taking, listening and taking notes. Being diplomatic, agreeing and disagreeing • Discussion groups and briefing sessions. • Press announcements **Process Management** • Describing processes, cause and effect • Criticizing, recommending • Quality assurance, continuous improvement
III	**The Art of Effective Writing** • Dynamics of Writing • Business letter – Format, style and content. • Letters of enquiry, quotations and offers. • Orders & Order acknowledgements. • Sales promotion letters. • Banking and credit letters **Job interviews** Job application letter Cover letter, Resume writing

IV	**The Art of Effective Reading** • Four Basic Steps to Effective Reading • Overcoming Common Obstacles • Types of Reading Skimming Scanning • Extensive Reading • Intensive Reading **Business Correspondence** • Notices • E-mails • Circulars • Memos
V	**Developing Effective Listening Skills** Process and Types of Listening Barriers in Listening Five Steps to Active Listening • **Group Discussions** • **Public Speaking:** **a. Preparation,** **b. Attire,** **c. Posture and Delivery Techniques** • **Data Interpretation** • **The Art of Condensation** Précis Writing Add Making Captions and Slogans • **Report Writing** Feasibility Report News Report Business Report • **Case Studies**

TEXT / REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
	TEXT BOOKS
T	1. Communication Skills – a workbook by Sanjay Kumar and Pushp Lata of OUP 2. Business Correspondence and Report Writing – RC Sharma , Krishna Mohan Mc. Graw Hill
	REFERENCE BOOKS
	1) Business Communication - K. K. Sinha - Galgotia Publishing Company, New Delhi. 2) Media and Communication Management - C. S. Rayudu - Himalaya Publishing House, Bombay. 3) Essentials of Business Communication - Rajendra Pal and J. S. Korlhalli - Sultan Chand & Sons, New Delhi. 4) Business Communication (Principles, Methods and Techniques) Nirmal Singh - Deep & Deep Publications Pvt. Ltd., New Delhi. 5) Business Communication - Dr. S.V. Kadvekar, Prin. Dr. C. N. Rawal and Prof. Ravindra Kothavade - Diamond Publications, Pune.

6) Business Correspondence and Report Writing - R. C. Sharma, Krishna Mohan - Tata McGraw-Hill Publishing Company Limited, New Delhi.
7) Communicate to Win - Richard Denny - Kogan Page India Private Limited, New Delhi.
8) Modern Business Correspondence - L. Gartside - The English Language Book Society and Macdonald and Evans Ltd.
9) Business Communication - M. Balasubrahmanyan - Vani Educational Books.
10) Creating a Successful CV - Siman Howard - Dorling Kindersley.

WEB SOURCE REFERENCES	
1	www.bbc.co.uk/worldservice/learningenglish
2	www.voanews.com
3	www.a4esl.org
4	www.ego4u.com
5	www.cexams.com

COURSE OUTCOMES: At the end of this course, the students will be able to	
CO1	Understand the fundamentals of communication and the way it is applied in organizations.
CO2	Evaluate the elements of organizational communication
CO3	Develop the art of effective writing skills according to the business situations.
CO4	Develop the art of effective reading and listening skills.
CO5	Prepare effective reports.

CO – PO MAPPING:

Course Title:		BUSINESS COMMUNICATION-LAB				
Course Code:		A2MBL301				
Course Designed by:		Department of English				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1					3	
CO2					3	
CO3					3	
CO4						2
CO5					2	
Overall					3	2

Course designed by	Department of English
Approval	Approved by: Meeting of Board of Studies held on 08.07.2019
	Ratified by: 5th Meeting of Academic Council, 13.07.2019

A2MBT307	SEMESTER - II	L	T	P	C
	ENTREPRENEURSHIP	3	1	-	4
	Total Contact Hours – 45				

COURSE OBJECTIVES	
COBJ1	To give the basic understanding of the various concepts and factors of entrepreneurship
COBJ2	To explain various areas of entrepreneurial opportunities and success factors
COBJ3	To outline how to organize feasibility study of the business idea and make comprehensive business plan
COBJ4	To demonstrate the need for continuous monitoring and promotion of the market and development of the business with timely funding.
COBJ5	To explain the importance of Govt. policies and initiatives and purposeful entrepreneurial responses

SYLLABUS

UNIT-I BASIC ASPECTS OF ENTREPRENEURSHIP: Nature of Entrepreneur & Entrepreneurship – Evolution of Entrepreneurship – Types of Entrepreneurs – Role of Entrepreneurship in Economic Development, few success stories of entrepreneurs.

UNIT-II FORMS OF ENTREPRENEURSHIP: Family business – Women Entrepreneurship and Problems – Startup Entrepreneur — Intrapreneurship – Rural Entrepreneurship – Social Entrepreneurship – Characteristic of successful Entrepreneurs – Desirable and acquirable attributes of an Entrepreneur. Myths and realities of Entrepreneurship

UNIT-III BUSINESS PLAN AND DPR:- Creativity and innovation, Idea generation sources, Evaluation and judgement, conducting Feasibility Study – contents of Detail Project Report (DPR) – Business Plan - Innovative methods of presenting a business plan

UNIT-IV MSME'S DEVELOPMENT AND FUNDING: Current MSMEs scenario in India-Nature of organization and ownership, Productivity enhancement, Market promotion, product development, modernization, technological upgradation and other environmental impact on MSMEs.Challenges of MSMEs, Regulatory and legal frame work of MSMEs – Support system by Central Government: NBMSME, COIR Board, SIDO, SISI, NSIC, NIESBUD, SIDBI

UNIT-V GOVERNMENT POLICIES AND INITIATIVES: MSMED Act 2006-Objectives and main initiatives, Role of Development banks & Commercial banks – State Institutional support to MSMEs through DIC — Future of MSMEs – Recent initiatives of Govt. of India – Startups, Make in India, Ease of Doing Business

NOTE: Relevant cases have to be discussed in each unit

REFERENCE BOOKS:

1. Abrams (2016). The Successful Business Plan: Secrets and Strategies. Planning Shop, USA, 6th Edition.
2. D.F.Kuratko and T.V.Rao (2016), Entrepreneurship: A South Asian Perspective, Cengage Learning.
3. Dollinger (2003). Entrepreneurship. Pearson, New Delhi.
4. Hisrich et.al (2010). Entrepreneurship. Tata McGraw Hill, New Delhi.
5. Raj Shankar (2012). Entrepreneurship: Theory & Practice.

COURSE OUTCOMES: At the end of this course, the students will be able to	
CO1	Understand the nature of entrepreneurship and identify personal attributes that enable best use of entrepreneurial opportunities.
CO2	Analyze various types of Entrepreneurship and successful criteria.
CO3	Select products/services, doing feasibility study and prepare detail project report.
CO4	Appraise product development, market promotion with environmental changes and monitoring financial conditions and funding of the project.
CO5	Analyze Govt. policies and initiatives on supportive schemes and legal issues and liaison with institutions working for the cause.

CO – PO MAPPING:

Course Title:	ENTREPRENEURSHIP					
Course Code:	A2MBT307					
Course Designed by:	Department of Management Studies					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	2	2				
CO2	2					2
CO3			3	2	2	
CO4		2	2			
CO5	2		2			
Overall	2	2	2	2	2	2

Course designed by	Department of Management Studies
Approval	Approved by: Meeting of Board of Studies held on 08.07.2019
	Ratified by: 5th Meeting of Academic Council, 13.07.2019

A2MBT308	SEMESTER - II	L	T	P	C
	MARKETING MANAGEMENT	3	1	-	4
	Total Contact Hours – 45				

COURSE OBJECTIVES	
COBJ1	To explain the evolution of marketing and forces affecting the business firms.
COBJ2	To detail the functions of marketing.
COBJ3	To elaborate the ways to use marketing mix variables for profitability with ethical considerations.

SYLLABUS

UNIT–I INTRODUCTION TO MARKETING MANAGEMENT: Need, Want, Demand, Market - Evolution of Marketing Concept - Analysing Marketing Environment using PESTEL analysis – analysing Competition with Porter's Five Forces Framework- Marketing Mix

UNIT–II MARKETING RESEARCH: Importance, Process - Functions of Marketing: Market Segmentation- Definition and Bases for Segmentation - Targeting- Consideration for effective targeting - Positioning for Competitive Advantage- Point of Parity and Point of Difference.

UNIT–III PRODUCT: Product vs Services, Product Classification, product mix and product line – Branding – Elements and value of branding- Product Life Cycle - Stages in New Product Development and Product Extension Strategies

UNIT–IV PRICING: Pricing Objectives, Pricing Methods, Pricing Strategies- Ethical aspect of Pricing-Place: Designing Marketing Channels- Managing the Marketing Channel and Supply Chain-Ethical aspects of marketing channel.

UNIT–V PROMOTIONAL MIX ELEMENTS: Advertising, sales Promotion, Public Relation, Personal Selling, Direct Marketing- Online Marketing-Ethical aspects of Promotion.

NOTE: Relevant cases have to be discussed in each unit

TEXT BOOKS:

1. Philip Kotler, Keller, Koshy, Jha, Marketing Management, Pearson, New Delhi.
2. Ramaswamy and Namakumari, Marketing Management, MacMillan, New Delhi.

REFERENCE BOOKS:

1. Grewal and Levy, Marketing, Mc Graw Hill Education, Chennai.
2. Philip Kotler, Keller, Koshy, Jha, Marketing Management, Pearson, New Delhi.
3. Ramaswamy and Namakumari, Marketing Management, MacMillan, New Delhi.
4. Tapan K Panda: "Marketing Management Text and Cases", Excel Books, New Delhi.
5. Boone and Kurtz: "Principles of Marketing ", Cengage Learning, New Delhi.
6. Rajan Saxena: "Marketing Management, 2/e, Tata McGraw Hill, New Delhi
7. VS Ramaswamy, S.Namakumari:, "Marketing Management", 3/e, Macmillan, New Delhi
8. Karunakaran: "Marketing Management", Himalaya Publishing House, Mumbai.
9. M.Govindarajan: "Marketing Management, Concepts, Cases, Challenges and Trends", PHI Private Limited, New Delhi
10. T.N.Chhabra, SK.Grover: "Marketing Management", Dhanpat Rai and Co., New Delhi
11. Paul Baines, Chris Fill, Kelly Page: "Marketing", Oxford University Press, New Delhi

COURSE OUTCOMES: At the end of this course, the students will be able to	
CO1	Analyze the marketing environment and Competitive forces in the market
CO2	Design appropriate STP strategies and understand the importance of Marketing Research
CO3	Evaluate various elements of Product strategies
CO4	Formulate pricing strategies and distribution channel by considering various factors affecting the same
CO5	Design promotional mix strategies for a business while incorporating ethical considerations

CO – PO MAPPING:

Course Title:	MARKETING MANAGEMENT					
Course Code:	A2MBT308					
Course Designed by:	Department of Management Studies					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	3		2	2		
CO2	2		2	2	2	
CO3	2		2	2		
CO4	3	2	3	2		
CO5	2	3	2	2	2	
Overall	2	3	2	2	2	

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Course designed by	Department of Management Studies
Approval	Approved by: Meeting of Board of Studies held on 08.07.2019
	Ratified by: 5th Meeting of Academic Council, 13.07.2019

A2MBT309	SEMESTER - II	L	T	P	C
	FINANCIAL MANAGEMENT	3	1	-	4
	Total Contact Hours – 45				

COURSE OBJECTIVES	
COBJ1	To explain the concept of financial management and its objectives and functions
COBJ2	To elaborate capital structure of a company and the impact of leverage on shareholders returns
COBJ3	To explain various investment appraisal techniques.
COBJ4	To evaluate the factors which determines decision of pay out or retention of profits earned
COBJ5	To evaluate the working capital and determinants of working capital of firm.

SYLLABUS

UNIT-I INTRODUCTION: Nature, Scope and Objectives of Financial Management, the new role in contemporary scenario, Goals of FM-Profit Maximization Vs Wealth Maximization Vs Satisficing- Finance Functions

UNIT-II FINANCING DECISION: Leverage – Operating leverage and Financial Leverage – Impact of leverage on shareholders returns - EPS-EBIT Analysis; Capital Structure – Factors Affecting Capital Structure, Capital Structure theories. Components of Cost of Capital, Measurement of Weighted Average Cost of Capital

UNIT–III INVESTMENT DECISION: Nature and Significance of Investment Decision-Estimation of Cash Flows – Capital Budgeting Process – Techniques of Investment Appraisal: Pay Back Period; Accounting Rate of Return, Time Value of Money- DCF Techniques –Net Present Value, Internal Rate of Return and Profitability Index

UNIT-IV DIVIDEND DECISION: Meaning and Significance – Determinants of Dividend – Dividend policy – Bonus Shares – Stock Splits. Theories of Dividend

UNIT–V WORKING CAPITAL DECISION: Importance and Factors affecting Working Capital – Concepts of Working Capital - Cash Management – Cash Budgeting – Accounts Receivables – Credit Policies – Inventory Management.

NOTE: Relevant cases have to be discussed in each unit

REFERENCE BOOKS:

1. Khan & Jain : Financial Management, Tata McGraw Hill.: New Delhi. : 2012
2. RM Srivasthava: Financial Management and Policy, Himalaya Publications; New Delhi, 2010.
3. Pandey IM - Financial Management, Vikas, New Delhi : 2010
4. James C.Van Horne -- Financial Management & Policy, Prentice Hall of India.: New Delhi, 2013
5. PrasannaChandra;"Financial Management theory and practice", Tata McGrawHill ; New Delhi 2012

COURSE OUTCOMES: At the end of this course, the students will be able to	
CO1	Understand the concept of financial management, its objectives and roles played by the financial manager.
CO2	Analyze the factors determining the capital structure of an organization
CO3	Compare various investment appraisal techniques.
CO4	Understand the factors influencing the dividend declaration in a company.
CO5	Evaluate factors determining working capital requirements and understand the factors affecting the working capital of a firm

CO – PO MAPPING:

Course Title:	FINANCIAL MANAGEMENT					
Course Code:	A2MBT309					
Course Designed by:	Department of Management Studies					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	3		2			
CO2	3		3			
CO3	3	2	3		1	1
CO4	2	2	3		1	1
CO5	3		3			
Overall	3	2	3		1	1

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Course designed by	Department of Management Studies
Approval	Approved by: Meeting of Board of Studies held on 08.07.2019
	Ratified by: 5th Meeting of Academic Council, 13.07.2019

A2MBT310	SEMESTER - II	L	T	P	C
	HUMAN RESOURCE MANAGEMENT	3	1	-	4
	Total Contact Hours – 45				

COURSE OBJECTIVES	
COBJ1	To explain the basic principles of Human Resource Management.
COBJ2	To explore various processes and techniques for talent acquisition.
COBJ3	To introduce various training and developmental activities for new recruits and existing employees
COBJ4	To demonstrate the elements of compensation and various aspects of Industrial Relations.
COBJ5	To explore the latest trends in HR domain

SYLLABUS

UNIT-I FUNDAMENTALS OF HRM: Nature and Scope of HRM, Historical perspective of HRM, Crafts System to Human Relations Movement, Functions and Roles of HR manager, Challenges and Competencies of HR Manager.

UNIT-II TALENT ACQUISITION: Manpower Planning-Process and Forecasting to arrive HR decisions, Development of Job Analysis, Recruitment-Process and Methods, Selection Procedure.

UNIT-III PLACEMENT, TRAINING AND DEVELOPMENT: Onboarding, Performance Appraisal and Its Methods, Assessing Training Needs and Conducting Suitable Training Programmes, Career Management and Development Programmes.

UNIT-IV COMPENSATION MANAGEMENT AND INDUSTRIAL RELATIONS: Concepts and Basic Salary Structure, Factors determining Pay rates, Job Evaluation and Compensation Structure (Manager Vs Executive), Fringe benefits. Industrial Relations- Trade Unions, Collective Bargaining, Grievance & Disciplinary Procedure, Workers participation in management, Industrial conflicts, Quality of work life.

UNIT-V CURRENT ISSUES AND TRENDS IN HR: Diversity in workplace: Effects, Types of diversity (Age, Gender & Cultural Diversity with latest trends & examples) and Workplace discriminations, Artificial Intelligence- impact on HR, HR Metrics and Analytics - significance in decision making.

NOTE: Relevant cases have to be discussed in each unit

TEXT BOOKS*:*

1. Gary Dessler. (2017). FUNDAMENTALS OF HUMAN RESOURCE MANAGEMENT. Pearson. Noida. India.
2. V.S.P Rao. (2016). HUMAN RESOURCE MANAGEMENT. Taxmaan. New Delhi.

REFERENCE BOOKS:

1. Bohlander, Snell, Sherman: MANAGING HUMAN RESORUCES, Thomson – South Western
2. Monappa, Arun & Sayiadain, Mirza Personnnel Management, New Delhi: Tata McGraw Hill.
3. Beardwell, Ian & Holden, Len Human Resource Management: A Contemporary Prospective, New Delhi: McMillan.
4. Jeffrey Pfeffer, The Human Equation: Building Profits by Putting People First, Boston, MA: Harvard Business School Press,.
5. Reichheld, Frederick F., The Loyalty Effect, Harvard Business School Press,.
6. Pfeffer, Jeffrey. Competitive Advantage Through People, Harvard Business School Press, 1994.
7. "Gupta G.P." Management by Consciousness in 21st Century, Excel Books,

WEB RESOURCES:

1. http://forum.hrdiscussion.com/
2. http://network.hrmtoday.com/forum
3. http://www.citeman.com/11853-evolution-of-the-concept-of-hrm/
4. www.citeHR.com

COURSE OUTCOMES: At the end of this course, the students will be able to	
CO1	Comprehend the basic concepts of HRM
CO2	Understand recruitment processes and selection procedure
CO3	Assess employee performance and design suitable T&D activities
CO4	Construct and calculate the salary structure and outline the IR issues
CO5	Compose HR metrics and evaluate the trends of HRM.

CO – PO MAPPING:

Course Title:		HUMAN RESOURCE MANAGEMENT				
Course Code:		A2MBT310				
Course Designed by:		Department of Management Studies				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	3	1		2		3
CO2	3	2		1	2	
CO3	3	3		3	3	
CO4	3	3	2	2	2	
CO5	1		2	2		1
Overall	3	2	2	2	2	2

Course designed by	Department of Management Studies
Approval	Approved by: Meeting of Board of Studies held on 08.07.2019
	Ratified by: 5th Meeting of Academic Council, 13.07.2019

A2MBT311	SEMESTER - II	L	T	P	C
	STRATEGIC MANAGEMENT	3	1	-	4
	Total Contact Hours – 45				

COURSE OBJECTIVES	
COBJ1	To explain the various aspects of strategic management process
COBJ2	To analyze the factors that shapes a company's strategy in view of competition.
COBJ3	To enable the students to apply the concepts of environmental scanning and leadership.
COBJ4	To evaluate the viewpoints of senior and top management executives.

SYLLABUS

UNIT-I STRATEGY AND THE ORGANIZATION: Concepts in Strategic Management, Strategic Management as a process –Developing a strategic vision, Mission, Objectives, Policies – Factors that shape a company's strategy – Crafting a strategy – Industry and Competitive Analysis

UNIT-II ENVIRONMENTAL SCANNING AND LEADERSHIP: Methods. SWOT Analysis – Competitive Advantage and Value Chain, Competing through Business Models – Competitive Advantage and Firm Resources. Strategic Analysis and Choice: Tools and techniques- Strategic Leadership: Leadership and Style – Key Strategic Leadership Actions – Developing Human Capital and Social Capital – Balanced Scorecard.

UNIT-III STRATEGY FORMULATION: Strategy Framework For Analyzing Competition, Porter's Value Chain Analysis, Generic Strategies and Competitive Advantage –The Dynamics of Competitive Advantage –Competitive Advantage to Corporate Advantage –Integrative Analysis. Turnaround strategy and diversification strategies.

UNIT-IV STRATEGY IMPLEMENTATION: Strategy and Structure, Leadership, culture connection – Strategies for competing in Globalizing markets and internet economy – Organizational Values and Their Impact on Strategy – Resource Allocation – Planning systems for implementation. Balancing Strategic Intent and Strategic Reality.

UNIT-V STRATEGY EVALUATION AND CONTROL: Establishing strategic controls – Measuring performance – appropriate measures- Role of the strategist – using qualitative and quantitative benchmarking to evaluate performance – strategic information systems – problems in measuring performance – Strategic surveillance –strategic audit.

NOTE: Relevant cases have to be discussed in each unit

REFERENCE BOOKS:

1. Kazmi: Strategic Management and Business Policy, Tata McGraw Hill, 2009
2. R.Srinivasn: Strategic Management, PHI Learning, New Delhi, 2009
3. Adrian Haberberg&Alison: Strategic Management, Oxford University Press, New Delhi,2009
4. P.SubbaRao: Business Policy and Strategic Management, Himalaya Publishing House, NewDelhi, 2010
5. AppaRao, ParvatheshwarRao, Shiva Rama Krishna: Strategic Management and Business Policy, Excel Books, New Delhi, 2008

COURSE OUTCOMES: At the end of this course, the students will be able to	
CO1	Develop strategy by understanding the decision making process at the strategic level.
CO2	Appraise the environmental factors related to intended strategy
CO3	Explain the steps involved in strategy formulation in dynamic environment.
CO4	Understand various factors involved in implementation and actual execution.
CO5	Evaluate the strategy performance and apply the controlling measures as needed.

CO – PO MAPPING:

Course Title:	STRATEGIC MANAGEMENT					
Course Code:	A2MBT311					
Course Designed by:	Department of Management Studies					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	1		3	2		
CO2	3	1	2	1		2
CO3	2	1	3	3	2	
CO4	1	2	2	2	2	2
CO5	2	2	2			1
Overall	2	2	2	2	2	1

Course designed by	Department of Management Studies
Approval	Approved by: Meeting of Board of Studies held on 08.07.2019
	Ratified by: 5th Meeting of Academic Council, 13.07.2019

A2MBT312	SEMESTER - II	L	T	P	C
	OPERATIONS MANAGEMENT	3	1	-	4
	Total Contact Hours – 45				

COURSE OBJECTIVES	
COBJ1	To understand the role of Operations in overall Business Strategy of the firm
COBJ2	To understand the process and strategies for system design
COBJ3	To familiarize the students with the techniques for effective utilization of operational resources and managing the processes to improve productivity and quality
COBJ4	To identify and evaluate the key factors and their interdependence in planning and managing operations
COBJ5	To develop an ability to understand Contemporary developments in operations management

SYLLABUS

UNIT–I INTRODUCTION: operations management overview – operations management strategy framework – systems concept of production – historical evolution of operations management.

UNIT–II PRODUCT DEVELOPMENT AND SYSTEM DESIGN: Process Strategy - Capacity Planning Decisions - Facilities Location Strategies – location and layout strategies – Decision making in location - assembly line – LOB technique – optimization of product and process designs.

UNIT-III PRODUCTIVITY AND QUALITY TOOLS: Productivity concepts – Value engineering – Total Quality Management – Statistical Quality control – Maintenance Planning – Work study – method study – Work measurement.

UNIT–IV PLANNING AND MANAGING OPERATIONS: Purchase procedure **-** Vendor selection – Materials Management – Inventory Management – JIT – Material requirement planning – Aggregate planning – Scheduling.

UNIT–V ADVANCE OPERATIONS MANAGEMENT: Service operations management – Lean systems – CAD/CAM – Flexible manufacturing systems – CNC machines - DSS for operations management

Note: Relevant cases have to be discussed in each unit

REFERENCE BOOKS:

- Aggarwal L.N, Parag Diwan, (2015) Management of Production Systems, Global Business Press.
- Alan Muhlemann, John Oakland, Keith Lockyer (2017) Production and Operations Management, Mac Milan , India, IV Edition.
- Barry Render, Jay Heizer (2017) Principles of Operations Management with tutorials, Prentice Hall, Inc. II Edition.
- Buffa S.Elwood, Sarin K Rakesh (2015) Instructor's Manual to Accompany Modern Production/Operation Management, John Wiley & Sons Inc III Edition.
- Everett Adam, Ronald J Ebert (2004), Production and Operations Management Prentice Hall, IV Edition

COURSE OUTCOMES: At the end of this course, the students will be able to	
CO1	Understand the role of Operations in overall Business Strategy of the firm - the application of Operations management policies and techniques manufacturing firms
CO2	Design the conversion system and also to understand the factors influencing while designing a system
CO3	Understand the quality dimensions of the product along with productivity improvement models
CO4	Understand the process scheduling work and also planning the sequence of operations
CO5	Apply latest technologies in operations management

CO – PO MAPPING:

Course Title:	OPERATIONS MANAGEMENT					
Course Code:	A2MBT312					
Course Designed by:	Department of Management Studies					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	3		3			
CO2	2		2			
CO3			2			
CO4			2		2	
CO5	2		2			
Overall	2		2		2	

Course designed by	Department of Management Studies
Approval	Approved by: Meeting of Board of Studies held on 08.07.2019
	Ratified by: 5th Meeting of Academic Council, 13.07.2019

A2MBL302	SEMESTER - II	L	T	P	C
	COMPUTER APPLICATIONS FOR BUSINESS – LAB	2	2	-	3
	Total Contact Hours – 45				

COURSE OBJECTIVES	
COBJ1	To explain various commands of MS – Office and its application in real world
COBJ2	To interpret the use of SQL commands and how to do MS project
COBJ3	To demonstrate the use of search engines

SYLLABUS

UNIT–I MS WORD

- Basics
- Creating Templates
- Converting to & from PDF

UNIT–II MS EXCEL

- Basics
- Cell Referencing
- In-built functions
- Charts
- Pivot Tables
- **Calculation of various financial functions**
- Example Applications (Time Value of Money, NPV, EMI with Varying Interest Rates, Stock Technical Analysis and so on)

MS POWER POINT

- Basics
- Importing or Creating Style Templates
- **slide show controls**
- **customizing presentation**

UNIT–III SEARCH ENGINE USAGE

- How to effectively search
- Search Operators
- Meta Data

UNIT–IV MS PROJECT

- WBS
- PERT/CPM
- Project Tracking

UNIT–V SQL SERVER

- Connecting to a SQL Server from Client
- Querying data from existing database using SQL
- Basics of ER Modeling

REFERENCE BOOKS:

1. Scott Urman, "**Oracle 8i-PL SQL Programming**", TMH, 2000.

2. Loney, "**Oracle 8i—The Complete Reference**", TMH, 2000.

3. Loney, "**Oracle 9i—The Complete Reference"**, TMH, 2002.

4. Bayross, "**Oracle Teach Yourself SQL / PL SQL using Oracle 8i and 9i with SQL"**, BPB, 2002.

5. Abbey, "**Oracle 8i—A beginner's Guide"**, TMH, 2000.

6. Courter, "**Mastering Microsoft Project"**, BPB, 2002.

7. Pyron, "**Using MS Project"**, Techmedia, 2002.

8. Bayross, "**PL SQL the Programming Language of Oracle"**, BPB, 2002.

COURSE OUTCOMES: At the end of this course, the students will be able to	
CO1	Use MS word tool for documentation.
CO2	Apply MS excel for graphs and other calculations and Prepare presentations on power point.
CO3	Understand Meta Data and effectively use search engine.
CO4	Apply MS Project for Project Tracking
CO5	Understand SQL Commands

CO – PO MAPPING:

Course Title:		COMPUTER APPLICATION FOR BUSINESS – LAB				
Course Code:		A2MBL302				
Course Designed by:		Department of CSE				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	2				3	2
CO2			2		3	2
CO3						
CO4	2	3			3	1
CO5	3		2		2	1
Overall	2	3	2		3	2

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Course designed by	Department of CSE
Approval	Approved by: Meeting of Board of Studies held on 08.07.2019
	Ratified by: 5th Meeting of Academic Council, 13.07.2019