ACHARYA NAGARJUNA UNIVERSITY

A State Government University, Accredited with "A" Grade by NAAC

Nagarjuna Nagar - 522 510, Guntur, Andhra Pradesh, India.

B.Tech. ELECTRICAL & ELECTRONICS ENGINEERING

SYLLABUS

2022 - 2023 onwards

Dr. Y.S.R. ANU COLLEGE OF ENGINEERING & TECHNOLOGY

PROGRAM CODE: ANUCETUG03


ACHARYA NAGARJUNA UNIVERSITY
సత్యం సర్వం ప్రతిష్ఠితమ్

ABOUT UNIVERSITY

ACHARYA NAGARJUNA UNIVERSITY (ANU)

- A Brief Profile

Acharya Nagarjuna University, a State University established in 1976, has been constantly striving towards achieving progress and expansion during its existence for over four decades, in terms of introducing new courses in the University Colleges, affiliated colleges and professional colleges. Spread over 300 acres of land on the National High Way (NH-16) between Vijayawada and Guntur of Andhra Pradesh, the University is one of the front ranking and fastest expanding Universities in the state of Andhra Pradesh. The University was inaugurated on 11th September, 1976 by the then President of India, Sri Fakruddin Ali Ahmed and celebrated its Silver Jubilee in 2001. The National Assessment and Accreditation Council (NAAC) awarded "A" grade to Acharya Nagarjuna University and also has achieved 108 International ranks, 39 National ranks UI Green Metrics rankings and many more It is named after Acharya Nagarjuna – one of the most brilliant preceptors and philosophers, whose depth of thought, clarity of perception and spiritual insight were such that even after centuries, he is a source of inspiration to a vast number of people in many countries. The University is fortunate to be situated on the very soil where he was born and lived, a soil made more sacred by the aspiration for light and a state of whole someness by generations of students. With campus student strength of over 5000, the University offers instruction for higher learning in 68 UG & PG programs and guidance for the award of M.Phil. and Ph.D. in 48 disciplines spread over six campus colleges and one PG campus at Ongole. It also offers 160 UG programs in 440 affiliated colleges in the regions of Guntur and Prakasam Districts. It has a Centre for Distance Education offering 87 UG & PG programs. Characterized by its heterogeneous students and faculty hailing from different parts of the state and the country, the University provides most hospitable environment for pursuing Higher Learning and Research. Its aim is to remain connected academically at the forefront of all higher educational institutions. The University provides an excellent infrastructure and on- Campus facilities such as University Library with over one lakh books & 350 journals; Computer Centre; University Scientific Instrumentation Centre; Central Research Laboratory with Ultra-modern Equipment; Well-equipped Departmental Laboratories; Career Guidance and Placement Cell; Health Centre; Sports Facilities with Indoor & Outdoor Stadiums and Multipurpose Gym; Sports Hostel; Separate hostels for Boys, Girls, Research Scholars and International Students; Pariksha Bhavan (Examinations Building); Computers to all faculty members; Wi-Fi connectivity to all Departments and Hostels; Canteen, Student Centre & Fast-food Centre; Faculty Club; Dr. H.H. Deichmann & Dr. S.John David Auditorium cum Seminar Hall; Post office; Telecom Centre; State Bank of India; Andhra Bank; Energy Park; Silver Jubilee Park; Fish ponds; internet center; xerox center; cooperative stores; Water harvesting structures.

VISION, MISSION & OBJECTIVES OF THE UNIVERSITY

ACHARYA NAGARJUNA UNIVERSITY

VISION

To generate sources of knowledge that dispels ignorance and establish truth through teaching, learning and research.

MISSION

To promote a bank of human talent in diversified faculties – Commerce & Management Studies, Education, Engineering & Technology, Humanities, Law, Natural Sciences, Pharmacy, Physical Education & Sports Sciences, Physical Sciences and Social Sciences that would become an investment for a prosperous society.

OBJECTIVES

- To inspire and encourage all who would seek knowledge through higher education and research.
- To provide quality instruction and research for the advancement of science and technology.
- To promote teaching and research studies in disciplines of societal relevance.
- To bridge the gap between theory and practice of the principles of higher education.
- To develop human talent necessary for the industry.
- To open up avenues of higher education and research through non-formal means.
- To invite and implement collaborations with other institutes of higher learning on a continuous basis for mutual academic progress.
- To motivate and orient each academic department/center to strive for and to sustain advanced levels of teaching and research so that the university emerges as an ideal institute of higher learning.
- To focus specially on the studies involving rural economy, justifying its existence in the rural setting.

VISION

&

MISSION OF THE COLLEGE

ACHARYA NAGARJUNA UNIVERSITY

Dr. Y.S.R. ANU COLLEGE OF ENGINEERING & TECHNOLOGY

ABOUT ANUCET:

The ANU college of Engineering & Technology is established in the academic year 2009-2010 in the University campus under the able leader ship of the Vice-chancellor, Prof. Hara Gopal Reddy. The College offers UG and PG courses that include B.Tech. and M.Tech. The college commenced its operations with an annual intake of 60 into 5 branches of B.Tech. (Civil Engineering, Computer Science Engineering, Electronics & Communication Engineering, Electrical & Electronics Engineering & Mechanical Engineering), in addition to the existing branches another 3 new branches (Cyber Security, Artificial Intelligence & Machine Learning & Data Science) were added from 2022-23 academic year and intake of 20 into 5 branches of M.Tech. The institution has been growing from strength to strength and got recognition in limited period.

VISION OF THE COLLEGE:

ANU College of Engineering & Technology is started with an aim of imparting technical values in the students, who can change the shape of global scenario in engineering arena.

MISSION OF THE COLLEGE:

- To educate students for careers of leadership, innovation in engineering and its related fields.
- To expand the base of engineering knowledge through original research and by developing technology to serve the needs of society.

OBJECTIVES:

- ★ To inspire and encourage all knowledge seekers of higher education and research.
- ★ To provide quality instruction and research for the advancement of science and technology.
- ★ To promote teaching and research studies in disciplines of societal relevance.
- ★ To bridge the gap between theory and practice.
- ★ To develop human talent necessary for the industry.

VISION & MISSION OF THE DEPARTMENT

ACHARYA NAGARJUNA UNIVERSITY

Dr. Y.S.R. ANU COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING

VISION OF THE DEPARTMENT:

To evolve into a globally recognized department in the frontier areas of Electrical & Electronics Engineering (EEE) by producing innovative, creative and ethical Electrical & Electronics Engineers with research focus to meet socio-economic needs.

MISSION OF THE DEPARTMENT:

M1-Imparting quality education with professional ethics to Electrical & Electronics Engineering students to overcome challenges in professional career.

M2-Aimed to produce graduates having professional excellence.

M3-To carry out quality research having social & industrial relevance.

M4-To provide technical support to budding entrepreneurs and existing Industries.

ACHARYA NAGARJUNA UNIVERSITY

Dr. Y.S.R. ANU COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES (PEO's):

- PEO1: Practice engineering in a broad range of industrial, societal and real world applications.
- PEO2: Pursue advanced education, research and development, and other creative and innovative efforts in science, engineering, and technology, as well as other professional careers.
- PEO3: Conduct themselves in a responsible, professional, and ethical manner.
- PEO4: Participate as leaders in their fields of expertise and in activities that support service and economic development throughout the world.

PROGRAM OUTCOMES (PO's):

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSO's):

PSO1	An ability to Understand the theoretical and mathematical concepts to analyze real time problems.
PSO2	An Ability to Design and Analyze systems based on the theoretical and Practical Knowledge

ACHARYA NAGARJUNA UNIVERSITY

Dr. Y.S.R. ANU COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING

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PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
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ACHARYA NAGARJUNA UNIVERSITY
FACULTY OF ENGINEERING
ACADEMIC REGULATIONS 2022 (R22) FOR B.TECH. (REGULAR)
(APPLICABLE FOR THE STUDENTS ADMITTED DURING THEACADEMIC YEAR 2022-2023 AND ONWARDS)

1. ELIGIBILITY FOR ADMISSION:

Admission to the above program shall be made subject to the eligibility, qualification and specialization prescribed by the University for each program from time to time.

Admission shall be made either on the basis of merit/rank obtained by the qualifying candidates in EAMCET/ECET or otherwise specified, whichever is relevant.

The duration of B.Tech. program is of four academic years divided into eight semesters comprising of two semesters in each academic year. A student is required to choose a branch of study at the time of admission. Students under lateral entry will be admitted straightaway into Third semester of B.Tech. course in the respective branch. No change of branch shall be allowed after the admissions are closed.

2. AWARD OF B.TECH. DEGREE:

A student will be declared eligible for the award of the B.Tech. degree if he/she fulfils the following academic regulations:

i) Regular entry students shall pursue a course of study for not less than four academic years and in not more than eight academic years.

ii) Students who fail to fulfill all the academic requirements for the award of the degree within eight academic years (for Regular Entry) / six academic years (for Lateral Entry) from the year of their admission, shall forfeit their seat in B.Tech. course and their admission is cancelled.

Completing the course of study shall mean not only satisfying the attendance requirements but also passing of all the subjects within the respective stipulated period.

3. BRANCHES OF STUDY:

The following Branches of study are offered at present for B. Tech. degree

S.No.	Code	Branch
1	CE	Civil Engineering
2	CS	Computer Science and Engineering
3	EE	Electrical and Electronics Engineering
4	EC	Electronics and Communication Engineering
5	ME	Mechanical Engineering
6	CY	Cyber Security
7	AM	Artificial Intelligence and Machine Learning
8	DS	Data Science

and any other branch as approved by the authorities of the University from time to time.

Each Branch will have a curriculum with a syllabus that shall consist of the following:

i) General Core Courses
   a) Basic Sciences
   b) Engineering Sciences
   c) Humanities and social sciences
ii) Program core courses in Engineering / Technology
iii) Elective courses of Engineering / Technology / Management Entrepreneurship / Business Communication and allied fields.
iv) Open Electives/CBCS
v) Mandatory learning courses
vi) Project work

4. CREDITS:

i) Academic Year: Two consecutive (one odd + one even) semesters constitute one academic year.
ii) Choice Based Credit System (CBCS): The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses).
iii) Credit: A unit by which the course work is measured.

5. DISTRIBUTION AND WEIGHTAGE OF MARKS (INTERNAL & EXTERNAL):

i) The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks for theory and 100 marks for practical subject. In addition internship Project work shall be evaluated for 100 and 200 marks respectively.
ii) For both theory and lab subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the External Evaluation.
iii) There shall be five units in each of the theory subjects.
iv) For theory subjects, there shall be two midterm examinations during the semester. Each midterm examination shall consist of assignment for 10 marks and sessional test for 20 marks with duration of 135 minutes respectively.

    First midterm examination shall be conducted for 50% coverage of syllabus and second midterm examination shall be conducted for remaining 50% of syllabus. Both the midterm exams are compulsory. Final midterm examination marks for a total of 30 marks shall be arrived at, by considering the 80% weightage (24 marks) to that midterm examination in which the student scores more marks and the remaining 20% (6 marks) for other midterm exam.

    *Note 1: The assignment test paper shall contain 6 questions of equal weightage and student is asked to answer any 2 questions randomly and shall be condensed for 10 marks, any fraction rounded off to the next higher mark.

*Note 2: The sessional examination shall contain 3 questions out of which first question is objective(6marks) and compulsory and remaining two questions(7 marks each) having internal choice and shall be considered for 20 marks, any fraction rounded off to the next higher mark.

v) For theory subjects, there will be 5 questions with following pattern in the End-Examination.

a) All Questions have to be answered compulsorily.

b) All five questions, EITHER/OR type shall be followed with 12 marks for each.

c) In each question as mentioned in (c), one, two or more bits can be set.

vi) Further, whenever any theory subject with two parts is offered (combined subject), for ex: Electrical & Mechanical Technology, then there shall be only two parts Part A, Part B in the question paper.

First question objective can be equally divided into two parts.

Part – A: shall contain two questions, EITHER/OR type shall be followed with 12 marks for each.

Part – B: shall also contain two questions, EITHER/OR type shall be followed with 12 marks for each.

vii) Model Question paper for each theory course shall be prepared by the teacher within 15 days from the commencement of the semester and the same shall be forwarded to the Controller of Examinations through the Chairman, BOS concerned.

viii) For practical subjects there shall be a continuous evaluation during the semester for 30 internal marks and 70 end examination marks. Day-to-day work in the laboratory shall be evaluated for 15 marks by the concerned laboratory teacher based on the report of experiments/jobs (10 marks for the record submitted and 5 marks for day to day work). The end examination for 15 marks (10 marks for experiment and 5 marks for viva-voce) shall be conducted by the laboratory teacher and another examiner from the same department.

*Note: Day to day performance shall be recorded in student record (each experiment carries 15 marks, at least ten experiments should be done and average marks must be taken at the end of semester).

ix) For the subject having design and / or drawing, such as Engineering Drawing, Machine Drawing and Estimation, the distribution shall be 30 marks for internal evaluation and 70 marks for end examination. The Internal evaluation will be 20 marks for day-to-day work in the class that shall be evaluated by the concerned subject teacher based on the reports/submissions prepared in the class. Further, there shall be two midterm exams in a Semester for a duration of 2 hrs. Each evenly distributed over the syllabi for 20 marks and the average marks of both the mid examinations shall be considered as internal test marks. The sum of day-to-day evaluation and the internal test marks will be the final internal marks for the subject.

x) Out of a total of 150 marks for the project work, 50 marks shall be for Internal Evaluation and 100 marks for the End Semester Examination (Viva-voce). The viva-voce shall be conducted by a committee consisting of Head of the Department, Project Supervisor and an External Examiner nominated by the principal from the panel of 3 members proposed by Head of the Department. The project work shall start in IV-year II semester. The evaluation of project work shall be conducted at the end of the IV-year II semester. The Internal Evaluation shall be made on the basis of weekly progress (a minimum of 12 weeks and 3 marks for each week progress) and at least two seminars (one at the beginning of IV B.Tech. II semester (30 marks) and the other before submission of project work (20 marks) given by each student on the topic of his project.

xi) The laboratory records and internal test papers shall be preserved for minimum of 2 years in the respective departments and shall be produced to the Committees of the college as and when the same are asked for.

xii) A student shall be permitted to pursue up to a maximum of ONE elective courses under MOOCs during the Program. The courses must be of minimum 12 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to pursue and acquire a certificate for a MOOC course only from the organizations/agencies approved by the BoS in order to earn the 2 credits. The Head of the department shall notify the list of such courses at the beginning of the semester.

6. ATTENDANCE REQUIREMENTS:

i) A student shall be eligible to appear for end examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.

ii) Shortage of Attendance below 65% in aggregate shall in NO case be condoned.

iii) 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.

iv) Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.

v) A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester, as applicable. They may seek readmission for that semester when offered next.

vi) A stipulated fee shall be payable towards condonation of shortage of attendance to the college.

7. MINIMUM ACADEMIC REQUIREMENTS (FOR REGULAR ENTRY STUDENTS):

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.6

i. A student who could not secure a minimum of 50% aggregate from midterm examination marks is not eligible to appear for the semester end examination and shall have to repeat that semester.

ii. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, design, drawing subject or project if he secures not less than 40% of marks in the end examination and a minimum of 50% of marks in the sum total of the internal evaluation and end examination taken together. In the internship & project he/she should secure 40%. For practical examination if he secures not less than 50% of marks in the semester end examination.

iii. A student shall be promoted from I to II year only if he/she fulfils the academic requirements of attendance and internal marks as stipulated in clause 6 and 7 irrespective of back log subjects in I/IV B.Tech.

iv. A student shall be promoted from II to III year only if he/she fulfils the academic requirements of attendance and internal marks as stipulated in clause 6 and 7 and also must secure 70% of the credits of the subjects that have been studied up to I year II semester from irrespective of whether the candidate takes the end examination or not as per the normal course of study. At the time of commencement of class work, he must attain the re quired credits.

v. A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of attendance and internal marks as stipulated in clause 6 and 7 and also must secure 70% of the credits of the subjects that have been studied up to II-year II semester. At the time of commencement of class work, he must attain the required credits

And in case of getting detained for want of credits by sections ii and iii above, the student may make up the credits through supplementary exams of the above exams before the date of class work commencement of Third or Fourth year I semester respectively.

8. MINIMUM ACADEMIC REQUIREMENTS (FOR LATERAL ENTRY STUDENTS):

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.6

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 40% of marks in the end examination and a minimum of 50% of marks in the sum total of the internal evaluation and end examination taken together. In the Seminar & Comprehensive viva-voce he/she should secure 40%.

ii. A student who could not secure a minimum of 50% aggregate from midterm examination marks is not eligible to appear for the semester end examination and shall have to repeat that semester.

iii. A student shall be promoted from II to III year only if he/she fulfils the academic requirements of attendance and internal marks as stipulated in clause 6 and 7 irrespective of back log subjects in II/IV B.Tech.

iv. A student shall be promoted from III to IV year only if he/she fulfils the academic requirement of attendance and internal marks as stipulated in clause 6 and 7 and also must secure 70% of the subjects that have been studied up to III year I semester from

9. GRADING:

After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Table – Conversion into Grades and Grade Points assigned

Range in which the marks in the subject fall	Grade	Grade points assigned
≥ 90	O (Outstanding)	10
80-89	A+ (Excellent)	9
70-79	A (Very Good)	8
60-69	B+ (Good)	7
50-59	B (Above Average)	6
45-49	C (Average)	5
40-44	D (Pass)	4
< 40	F (Fail)	0
Absent	Ab (Absent)	0

i. A student obtaining Grade F shall be considered failed and will be required to reappear for that subject when the next supplementary examination offered.

ii. For non credit courses ‘Satisfactory’ or “Unsatisfactory’ shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

9.1. SEMESTER GRADE POINT AVERAGE (SGPA) AND CUMULATIVE GRADE POINT AVERAGE (CGPA):

i. The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by

a student and the sum of the number of credits of all the courses undergone by a student, i.e.

$$SGPA = \Sigma (Ci \times Gi)/ \Sigma Ci$$

Where, Ci is the number of credits of the i^{th} subject and Gi is the grade point scored by the student in the i^{th} course.

ii. The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.

$$CGPA = \Sigma (Ci \times Si)/ \Sigma Ci$$

Where 'Si' is the SGPA of the ith semester and Ci is the total number of credits in that semester.

iii. Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

iv. While computing the GPA/CGPA the subjects in which the student is awarded Zero grade points will also be included.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.

Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C, P and F.

10. GAP - YEAR:

Gap Year – concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after I year/II year/III year to pursue entrepreneurship full time. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. An evaluation committee shall be constituted to evaluate the proposal submitted by the student and the committee shall decide on permitting the student for having the Gap Year.

11. TRANSITORY REGULATIONS: (OLD REGULATIONS CHANGED)

i. Candidates who admitted into the four year B.Tech. degree course under R-20 regulations but who got detained in any year for want of attendance/minimum aggregate sessional marks may join the appropriate year /semester in the semester system applicable for that batch and be governed by the regulations of that batch from then onwards unless otherwise specified.

ii. A student admitted under credit-based regulations (CR) detained due to lack of sessional marks/attendance at the end of the first semester of II/IV B.Tech. shall join II/IV first semester of R-20 batch. Such students will study all the courses prescribed for that R-20 in which the student joins. However, the student has to clear all the first-year backlog subjects by appearing the supplementary examination. Such candidates will be governed by the regulations applicable to lateral entry candidates of R-20 batch for the award of the degree.

iii. A student admitted under CR, detained due to lack of sessional marks/attendance at the end of the second semester of II/IV B.Tech. /at the end of subsequent semesters shall follow the credit-based regulations only (CR).

12. WITH–HOLDING OF RESULTS:

If the candidate has any dues not paid to the college or if any case of indiscipline or malpractice is pending against him, the result of the candidate shall be withheld and he will not be allowed / promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

13. AWARD OF CLASS:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

Class Awarded	CGPA Secured
First Class with Distinction	≥ 8.0
First Class	≥ 6.5 < 8.0
Second Class	≥ 5.5 < 6.5
Pass Class	≥ 4.0 < 5.5

14. MINIMUM INSTRUCTION DAYS:

The minimum instruction period for a semester is 16 weeks. The minimum instruction days including exams for each semester shall be for 90 days.

15. BRANCH TRANSFER:

There shall be no branch transfers after the completion of admission process.

16. GENERAL:

i) The academic regulations should be read as a whole for purpose of any interpretation.
ii) Malpractice rules - nature and punishments is appended
iii) Where the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
iv) In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the BOS is final.
v) The University may from time to time, revise, amend or change the Regulations, Schemes of Examinations, and/or Syllabi.

17. CONDUCT AND DISCIPLINE:

a) Students shall conduct themselves within and outside the premises of the institute in a manner befitting the students of our institution.

b) As per the order of Honorable Supreme Court of India, ragging in any form is considered as a criminal offence and is banned. Any form of ragging will be severely dealt with.

c) The following acts of omission and / or commission shall constitute gross violation of the code of conduct and are liable to invoke disciplinary measures with regard to ragging.
   i) Lack of courtesy and decorum, indecent behavior anywhere within or outside the campus.
   ii) Will full damage of college / individual property
   iii) Possession, consumption or distribution of alcoholic drinks or any kind of narcotics or hallucinogenic drugs.
   iv) Mutilation or unauthorized possession of library books.
   v) Noisy and unseemly behavior, disturbing studies of fellow students.
   vi) Hacking of computer systems (such as entering into other person's areas without prior permission, manipulation and / or damage of computer hardware and software or any other cyber-crime etc.)
   vii) Usage of camera / cell phone in the campus
   viii) Plagiarism of any nature
   ix) Any other acts of gross indiscipline as decided by the academic council from time to time.

d) Commensurate with the gravity of offense, the punishment may be reprimand, fine, expulsion from the institute / hostel, debar from examination, disallowing the use of certain facilities of the institute, rustication for a specified period or even outright expulsion from the institute or even handing over the case to appropriate law enforcement or the judiciary, as required by the circumstances.

e) For an offence committed in (i) a hostel (ii) a department or in a class room and (iii) elsewhere, the chief warden, the head of the department and the principal respectively, shall have the authority to reprimand or impose fine.

f) Cases of adoption of unfair means and / or any malpractice in an examination shall be reported to the principal for taking appropriate action.

g) All cases of serious offence, possibly requiring punishment other than reprimand, shall be reported to the academic council.

h) The institute level standing disciplinary action committee constituted by the academic council shall be the authority to investigate the details of the offence, and recommend disciplinary action based on the nature and extent of the offence committed.

i) The principal shall deal with any academic problem, which is not covered under these rules and regulations, in consultation with the programs committee in an appropriate manner, and subsequently such actions shall be placed before the academic council for ratification. Any emergency modification of regulation, approved by the appropriate authority, shall be reported to the academic council for ratification.

j) "Grievance and Redressal Committee" (General) constituted by the Principal shall deal with all grievances pertaining to the academic / administrative / disciplinary matters.

18. PUNISHMENTS FOR MALPRACTICE CASES – GUIDELINES:

The examinations committee may take the following guidelines into consideration while dealing with the suspected cases of malpractice reported by the invigilators/squad members etc. during end examinations. The punishment may be more severe or less severe depending on the merits of the individual cases.

S. No.	Nature of Malpractices/Improper conduct	Punishment
1.	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 student 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.
2	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	Cancellation of the performance in that subject.
3	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.
4	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any other student 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 students involved. In case of an outsider, he will be handed over to the p is registered against him olice and a case
5	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 student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects including practical examinations and project work of that semester/year

6	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 including practical examinations and project work of that semester/year.
7	Smuggles in the Answer book or takes out or arranges to send out the question paper during the examination or answer book during or after the examination	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects including practical examinations and project work of that semester/year. The student is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
8	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 of that semester / year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over tothe police and a police case is registered against them.

9	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 including practical examinations and project work 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.
10	Possesses 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 including practical examinations and project work of that semester/year. The student is also debarred and forfeits the seat.
11	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 7 to 9.	For Student of the college: Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects including practical examinations and project work of that semester/year. 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.

12	Impersonates any other student in connection with the examination	The student who has impersonated shall be expelled from examination hall. The student is debarred from writing the remaining exams, and rusticated from the college fur one academic year during which period the student will not be permitted to write any exam. If the imposter is an outsider, he will be handed over to the police and a case is registered against him. The performance of the original student who has been impersonated, shall be cancelled in all the subjects of the examination including practical's and project work of that semester/year. The student is rusticated from the college for two consecutive years during which period the student will not be permitted to write any exam. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat
13	If any malpractice is detected which is not covered in the above clauses 1 to 12 it shall be reported to the college academic council for further action to award suitable punishment	
14	Malpractice cases identified during sessional examinations will be reported to the examination committee nominated by Academic council to award suitable punishment.	

CURRICULAR FRAMEWORK FOR REGULAR AND HONORS B.TECH. PROGRAMS OF ALL BRANCHES:

AWARD OF THE DEGREE:

A student will be declared eligible for the award of B. Tech. degree if he/she fulfills the following:

i) Pursues a course of study in not less than four and not more than eight academic years.

ii) After eight academic years from the year of their admission, he/she shall forfeit their seat in B. Tech course and their admission stands cancelled.

iii) Registers for 160 credits and must secure all the 160 credits.

iv) A student shall be eligible for the award of B.Tech. degree with Honors or Minor if he/she earns 20 credits in addition to the 160 credits. A student shall be permitted to register either for Honors or for Minor and not for both simultaneously.

CURRICULAR FRAMEWORK FOR HONORS PROGRAM:

1) Students of a Department/Discipline are eligible to opt for Honors Program offered by the same Department/Discipline.
2) A student shall be permitted to register for Honors program at the beginning of 4th semester provided that the student must have acquired a minimum of 8.0 SGPA up to the end of 2nd semester without any backlogs. In case of the declaration of the 3rd semester results after the commencement of the 4th semester and if a student fails to score the required minimum of 8 SGPA, his/her registration for Honors Program stands cancelled and he/she shall continue with the regular Program.
3) Students can select the additional and advanced courses from their respective branch in which they are pursuing the degree and get an honors degree in the same. e.g. If a Mechanical Engineering student completes the selected advanced courses from same branch under this scheme, he/she will be awarded B.Tech. (Honors) in Mechanical Engineering.
4) In addition to fulfilling all the requisites of a Regular B.Tech. Program, a student shall earn 20 additional credits to be eligible for the award of B. Tech (Honors) degree. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e., 160 credits).
5) Of the 20 additional Credits to be acquired, 16 credits shall be earned by undergoing specified courses listed as pools, with four courses, each carrying 4 credits. The remaining 4 credits must be acquired through two MOOCs, which shall be domain specific, each with 2 credits and with a minimum duration of 8/12weeks as recommended by the Board of studies.
6) It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. The courses offered in each pool shall be domain specific courses and advanced courses.
7) The concerned BoS shall decide on the minimum enrolments for offering Honors program by the department. If minimum enrolments criteria are not met then the students shall be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BoS.
8) Each pool can have theory as well as laboratory courses. If a course comes with a lab component, that component has to be cleared separately. The concerned BoS shall explore the possibility of introducing virtual labs for such courses with lab component. (Model pool list is enclosed in the Annexure-2)

9) MOOC courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Students have to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned will be as decided by the university/academic council.
10) The concerned BoS shall also consider courses listed under professional electives of the respective B. Tech programs for the requirements of B. Tech (Honors). However, a student shall be permitted to choose only those courses that he/she has not studied in any form during the Program.
11) If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.
12) In case a student fails to meet the CGPA requirement for Degree with Honors at any point after registration, he/she will be dropped from the list of students eligible for Degree with Honors and they will receive regular B.Tech. degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.
13) Honors must be completed simultaneously with a major degree program. A student cannot earn Honors after he/she has already earned bachelor's degree.

CURRICULAR FRAMEWORK FOR MINOR PROGRAM:

1) a) Students who are desirous of pursuing their special interest areas other than the chosen discipline of Engineering may opt for additional courses in minor specialization groups offered by a department other than their parent department. For example, If Mechanical Engineering student selects subjects from Civil Engineering under this scheme, he/she will get Major degree of Mechanical Engineering with minor degree of Civil Engineering
   b) Student can also opt for Industry relevant tracks of any branch to obtain the Minor Degree, for example, a B.Tech. Mechanical student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine learning track etc.
2) The BOS concerned shall identify as many tracks as possible in the areas of emerging technologies and industrial relevance / demand. For example, the minor tracks can be the fundamental courses in CSE, ECE, EEE, CE, ME etc or industry tracks such as Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), Robotics, Electric vehicles, Robotics, VLSI etc.
3) The list of disciplines/branches eligible to opt for a particular industry relevant minor specialization shall be clearly mentioned by the respective BoS.

4) There shall be no limit on the number of programs offered under Minor. The University/Institution can offer minor programs in emerging technologies based on expertise in the respective departments or can explore the possibility of collaborating with the relevant industries/agencies in offering the program.
5) The concerned BoS shall decide on the minimum enrolments for offering Minor program by the department. If a minimum enrolments criterion is not met, then the students may be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BoS.
6) A student shall be permitted to register for Minors program at the beginning of 4th semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 8 SGPA (Semester Grade point average) up to the end of 2nd semester without any history of backlogs. It is expected that the 3rd semester results may be announced after the commencement of the 4th semester. If a student fails to acquire 8 SGPA up to 3rd semester or failed in any of the courses, his registration for Minors program shall stand cancelled. An SGPA of 8 has to be maintained in the subsequent semesters without any backlog in order to keep the Minors registration active. 18
7) A student shall earn additional 20 credits in the specified area to be eligible for the award of B. Tech degree with Minor. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e., 160 credits).
8) Out of the 20 Credits, 16 credits shall be earned by undergoing specified courses listed by the concerned BoS along with prerequisites. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. If a course comes with a lab component, that component has to be cleared separately. A student shall be permitted to choose only those courses that he/she has not studied in any form during the Program.
9) In addition to the 16 credits, students must pursue at least 2 courses through MOOCs. The courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned as decided by the university/academic council.
10) Student can opt for the industry relevant minor specialization as approved by the concerned departmental BoS. Student can opt the courses from Skill Development Corporation (APSSDC) or can opt the courses from an external agency recommended and approved by concerned BOS and should produce course completion certificate. The Board of studies of the concerned discipline of Engineering shall review such courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest skills based on industrial demand.

11) A committee should be formed at the level of College/Universities/department to evaluate the grades/marks given by external agencies to a student which are approved by concerned BoS. Upon completion of courses the departmental committee should convert the obtained grades/marks to the maximum marks assigned to that course. The controller of examinations can take a decision on such conversions and may give appropriate grades.
12) If a student drops (or terminated) from the Minor program, they cannot convert the earned credits into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript. 19
13) In case a student fails to meet the CGPA requirement for B.Tech. degree with Minor at any point after registration, he/she will be dropped from the list of students eligible for degree with Minors and they will receive B. Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.
14) Minor must be completed simultaneously with a major degree program. A student cannot earn the Minor after he/she has already earned bachelor's degree.

STRUCTURE

ACHARYA NAGARJUNA UNIVERSITY

Dr. Y.S.R. ANU COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING

COURSE STRUCTURE

I/IV B.TECH. SEMESTER-I

S. No.	Course Details		Scheme of Instruction			Scheme of Examination		
	Code	Subject Name	Hours in a Week			Marks		Credits
			L	T	P	Int.	Ext.	
1	**EE111 (R22)**	Mathematics - I	3	1	0	30	70	3
2	**EE112 (R22)**	Engineering Chemistry	3	1	0	30	70	3
3	**EE113 (R22)**	Professional Communication Skills	3	1	0	30	70	3
4	**EE114 (R22)**	Electrical Circuit Analysis	3	1	0	30	70	3
5	**EE115 (R22)**	Problem Solving and Programming (using c)	3	1	0	30	70	3
6	**EE116 (R22)**	Environmental Science (mandatory)	3	0	0	30	70	0
7	**EE151 (R22)**	Engineering Chemistry Lab	0	0	3	30	70	1.5
8	**EE152 (R22)**	Communication Skills Lab	0	0	3	30	70	1.5
9	**EE153 (R22)**	Computer Programming Lab	0	0	3	30	70	1.5
TOTAL CREDITS								**19.5**

I/IV B.TECH SEMESTER-II

S. No.	Course Details		Scheme of Instruction			Scheme of Examination		
	Code	Subject Name	Hours in a Week			Marks		Credits
			L	T	P	Int.	Ext.	
1	**EE121 (R22)**	Mathematics – II	3	1	0	30	70	3
2	**EE122 (R22)**	Engineering Physics	3	1	0	30	70	3
3	**EE123 (R22)**	Electronics Devices and Circuits	3	1	0	30	70	3
4	**EE124 (R22)**	Engineering Graphics	3	1	0	30	70	3
5	**EE125 (R22)**	Python Programming	3	1	0	30	70	3
6	**EE161 (R22)**	Engineering Physics Lab	0	0	3	30	70	1.5
7	**EE162 (R22)**	EDC Lab	0	0	3	30	70	1.5
8	**EE163 (R22)**	Python Lab	0	0	3	30	70	1.5
TOTAL CREDITS								**19.5**

I/IV B.TECH.
SEMESTER I

ACHARYA NAGARJUNA UNIVERSITY

Dr. Y.S.R. ANU COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING

I/IV B.TECH. SEMESTER-I

EE 111 (R22): MATHEMATICS-I

(Common to all branches of Engineering)

L-3	T-1	P-0	M-100	C-3

COURSE OBJECTIVES:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

BRIDGE COURSE: Limits, continuity, Types of matrices

COURSE OUTCOMES:

After completion of this course, students will be able to –

CO1	Using Matrix method find the inverse of matrix, and using other methods solving Homogeneous and non-homogeneous equations. Determining the eigen values and eigen vectors.
CO2	Finding the approximate real root of given equation.
CO3	Finding partial derivatives of first and higher orders and maxima and minima of functions of two variables.
CO4	Evaluate double integrals techniques over a region of two dimensional and with polar coordinates.
CO5	Familiarize with special functions to evaluate some proper and improper integrals using beta and gamma functions.

Unit I:

Matrix Operations and Solving Systems of Linear Equations

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

Unit II:

Mean Value Theorems

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof);

Unit III:

Multivariable calculus

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Unit IV:

Double Integrals

Double integrals, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves.

Unit V: Laplace transform and its applications to Ordinary differential equations

Definition of Integral transform, Domain of the function and Kernel for the Laplace transforms. Existence of Laplace transform. Laplace transform of standard functions, first shifting Theorem, Laplace transform of functions when they are multiplied or divided by "t". Laplace transforms of derivatives and integrals of functions. – Unit step function – second shifting theorem. Dirac's delta function, Periodic function – Inverse Laplace transform by Partial fractions(Heaviside method) Inverse Laplace transforms of functions when they are multiplied or divided by "s", Inverse Laplace Transforms of derivatives and integrals of functions, Convolution theorem –- Solving ordinary differential equations by Laplace transforms.

TEXT BOOKS:

1) Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2) B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

REFERENCE BOOKS:

1) R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.

2) George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3) Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.

CO-PO/PSO MAPPING MATRIX:

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	-	-	-	-	-	-	-	2	3	-
CO2	1	3	-	-	-	-	-	-	-	1	3	-
CO3	2	3	-	-	-	-	-	-	-	2	2	-
CO4	2	2	-	-	-	-	-	-	-	3	2	-
CO5	2	3	-	-	-	-	-	-	-	1	3	-
AVG_CO	2	3	-	-	-	-	-	-	-	2	3	-

EE 112 (R22): ENGINEERING CHEMISTRY

L-3	T-1	P-0	M-100	C-3

COURSE OBJECTIVES:

At the end of the Course/Subject, the students will:

- To acquire knowledge about desalination of brackish water and treatment of municipal water.
- To gain the knowledge of conducting polymers, bio-degradable polymers and fiber reinforced plastics and the synthesis of nano materials.
- Apply electrochemical basics to the field of battery technology and the main components and chemistries and the manufacturing process of batteries assess different batteries by teaching them about battery specifications.
- To understand the mechanism of corrosion and preventive methods.
- This subject is designed to impart fundamental knowledge of the principles and instrumentation of spectroscopic and chromatographic techniques.
- The main processes involved during cement production will be discussed, including the extraction and processing of raw materials, the combustion process, cement grinding, quality control and storage, and cement distribution.
- To understand the nucleophilic substitution and elimination mechanisms.
- The synthesis of aspirin and paracetamol lab methods are used included recrystallization and scratching to produce a precipitate, which was then filtered to remove any excess moisture.

COURSE OUTCOMES:

After completion of this course, students will be able to –

CO1	Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost
CO2	Substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution. Design economically and new methods of synthesis nano materials.
CO3	Identify electronic components that can provide protection and specify a minimum set of protections needed - Compute stored energy in a battery pack - List the manufacturing steps of different types of lithium-ion cells and possible failure modes and apply their knowledge for protection of different metals from corrosion
CO4	Ability to understand, explain and select instrumental techniques for analysis
CO5	Develop the technique involved in the manufacturing process of cement Apply the knowledge about the properties of chemical fuels for the generation of power Apply the knowledge of various polymeric material, their synthesis and applications and synthesize medicinal compounds and the physical chemical properties of drugs using drug design software.

UNIT-I: WATER TECHNOLOGY

Various impurities of Water, WHO guidelines, Hardness unit sand determination by EDTA method, water treatment for drinking purpose-sedimentation, coagulation, filtration (slow sand filter), various methods of chlorination, breakpoint chlorination.

Water treatment for industrial purpose: Boiler troubles, scales, sludges, caustic embrittlement, boiler Corrosion, priming and foaming- causes and prevention, Internal conditioning - Phosphate, Calgon and Carbonate treatment, External conditioning-Lime Soda process (simple problems), softening by ion- Exchange process, Desalination of Brackish water by Electro dialysis and Reverse osmosis.

UNIT-II: POLYMER CHEMISTRY

Introduction to polymers, Functionality of monomers, chain growth and step growth polymerization, Co-polymerization (Stereo specific polymerization) with specific examples and mechanisms of polymer formation.

PLASTICS: Thermoplastics and Thermosetting, preparation, properties and applications of Bakelite, Elastomers, Preparation, properties and applications of BUNA-S and BUNA-N Rubbers.

Conducting Polymers- Introduction, examples, general applications and mechanism of Conduction on Polyacetylene.

Chemistry of Nano materials: Introduction to nano chemistry, preparation of nano materials - carbon nanotubes and fullerenes and their engineering applications.

UNIT-III: ELECTRO CHEMISTRY AND APPLICATIONS

Electrodes-concepts, types of cells, electro chemical series, Nernst equation.

BATTERIES: Primary cell (Dry cell), Secondary cell (Lead-acid), Lithium batteries and their advantages, Fuel cell (H_2-O_2 cell).

Corrosion:

Types of corrosions- chemical corrosion, dry corrosion, electro chemical corrosion and wet corrosion, galvanic series, pitting and differential aeration of corrosion, factors affecting corrosion.

Corrosion control: Cathodic protection, Corrosion Inhibitors, Electro plating (Au) & (Ni).

Learning Outcomes:

UNIT-IV: INSTRUMENTAL METHODS

Electromagnetic spectrum-Absorption of Radiation: Beer-Lambert's law-Principle and applications of Ultra-Violet, Infra-Red and Nuclear Magnetic Resonance Spectroscopy. Principle and applications of Gas Chromatography and HPLC Techniques.

UNIT-V:

i) **Cement and Concrete Chemistry**: Introduction to Building Materials, Portland Cement, Constituents, Manufacturing Process, Setting and Hardening Cement.

ii) **Organic reactions and synthesis of a drug molecule**: Introduction to reactions involving substitution (SN_1 and SN_2), elimination reactions (E_1 and E_2), Synthesis of commonly used drug molecule – Aspirin and Paracetmol.

PRESCRIBED TEXT BOOKS:

1) Engineering Chemistry, P.C. Jain and M. Jain – Dhanapathi Rai & Sons, Delhi
2) A text book of Engineering Chemistry, S.S. Dara - S. Chand & Co. New Delhi
3) Engineering Chemistry, B.K. Sharma - Krishna Prakashan, Meerut
4) Shashichawla, A text book of engineering chemistry, 3rd Edition, Dhanpatrai & Co., New Delhi, 2007.
5) Gurudeep raj & Chatwalanand, "Instrumental methods of analysis, 7th edition, CBS publications, 1986.
6) Quantitative analysis by day & underwood.
7) A Text book of Instrumental methods by Skoog and West.
8) H.W. Wilard and demerit, "Instrumental methods of analysis, 7thedition, CBS publications, 1986.
9) Text book of Nano Science and Nano technology, B.S. Murthy and P. Shankar, University.

CO-PO/PSO MATRIX MAPPING:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	1	2	-	-	1	-	3	3	3
CO2	3	2	1	1	-	-	2	-	-	1	-	3	2	2
CO3	3	2	1	2	1	-	-	-	-	1	-	3	2	2
CO4	3	3	2	1	1	-	-	-	-	1	-	2	2	3
CO5	3	3	2	2	-	1	-	-	-	1	-	3	3	2
AVG_CO	**3**	**3**	**2**	**1**	**1**	**1**	**2**	**-**	**-**	**1**	**-**	**3**	**3**	**3**

EE 113 (R22): PROFESSIONAL COMMUNICATION SKILLS

L-3	T-1	P-0	M-100	C-3

COURSE OBJECTIVES:

The course aims to inculcate a sense of professionalism among the students while emphasizing on the basic aspects of the language learning such as grammar and vocabulary building. It also aspires to train the students to meet the global challenges.

- Adopt activity-based teaching-learning methods to ensure that learners would be engaged in use of language in the classroom sessions.
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

COURSE OUTCOMES:

After completion of this course, students will be able to –

CO1	Identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English (L3)
CO2	Formulate sentences using proper grammatical structures and correct word forms (L3)
CO3	Speak clearly on a specific topic using suitable discourse markers in informal discussions
CO4	Write summaries based on global comprehension of reading texts (L3)
CO5	Produce a coherent paragraph interpreting a figure/graph/chart/table (L4)

UNIT-I:

1) Reading: Listening Skills – The Boy who broke the Bank (English & Soft Skills)
2) Writing: Paragraph Writing — 8 Hrs.
3) Grammar: Common Errors in Nouns- Pronoun Agreement
4) Vocabulary Building: Functional word list -100

UNIT- II: — 8 Hrs.

1) Reading: Assertive Skills – The Verger (English & Soft Skills)
2) Writing: Letter Writing (Formal and Informal)
3) Grammar: Correction of Errors in Subject- Verb Agreement
4) Vocabulary Building: Sign Post

UNIT - III: 8 Hrs.

1) Reading: Learning Skills – Three Questions (English & Soft Skills)
2) Writing: Note Making, Note Taking
3) Grammar: Correction of in Tense Usage
4) Vocabulary Building: One Word Substitutes

UNIT - IV: 8 Hrs.

1) Reading: Adaptability Skills – Senor Payroll (English & Soft Skills)
2) Writing: Pictorial Description
3) Grammar: Correction of Errors in Adjectives, Articles, Prepositions
4) Vocabulary Building: Synonyms and Antonyms

UNIT - V: 8 Hrs.

1) Reading: Written Communication Skills - Gateman's Gift (English & Soft Skills)
2) Writing: Information Transfer
3) Grammar: Correction of Errors in Wh- questions, Question Tags
4) Vocabulary Building: Idioms and Phrasal Words (200)

TEXT BOOKS:

1) Dhanavel S. P. English and Soft Skills, Orient Black Swan Pvt. Limited, 2013.
2) Barun K Mitra, Effective Technical Communication, Oxford University Publication, 2014.

REFERENCE BOOKS:

1) Bailey, Stephen. Academic writing: A handbook for International Students. Routledge, 2014.
2) Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3) Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
4) Michael Swan. Practical English Usage, OUP. 1995.
5) F.T. Wood. Remedial English Grammar, Macmillan.2007
6) Liz Hamp-Lyons and Ben Heasly. Study Writing, Cambridge University Press. 2006.
7) Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad.
8) Sharon J.Gerson, Steven M.Gerson, Technical Writing, New Delhi: Pearson education, 2007.
9) Sanjay Kumar and Pushp Lata, Communication Skills, Noida: Oxford University Press, 2012.
10) Dr. ShaliniVerma, Word Power Made Handy, S. Chand & Co Ltd., 2009.

CO-PO/PSO MAPPING MATRIX:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	2	2	-	-	2	3	-	3	3	-	-
CO2	-	-	-	2	2			2	3	-	3	3	-	-
CO3	-	-	-	2	2	-	-	2	3	-	3	3	-	-
CO4	-	-	-	2	2			2	3	-	3	3	-	-
CO5	-	-	-	2	2	-	-	2	3	-	3	3	-	-
AVG_CO	-	-	-	2	2			2	3	-	3	3	-	-

EE 114 (R22): ELECTRICAL CIRCUIT ANALYSIS

L-3	T-1	P-0	M-100	C-3

COURSE OUTCOMES:

- Analyze electrical circuits using Kirchhoff's laws, series and parallel connections of resistances, and nodal and loop analysis techniques.
- Apply various network theorems such as superposition theorem, Thevenin's theorem,
- Norton's theorem, maximum power transfer theorem, reciprocity theorem, and compensation theorem to simplify circuit analysis.
- Understand the concept of duality and its application in analyzing electrical networks.
- Analyze AC circuits in sinusoidal steady state using phasor diagrams, impedance, admittance, and effective or RMS values.
- Solve first and second-order differential equations for R-L, R-C, and R-L-C circuits, and determine the steady-state and transient responses of the circuits.

UNIT-I:

Network Theorems (10 Hours) Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Nodal and loop analysis. Superposition theorem, Thevenin’s theorem, Norton’s theorem, Maximum power transfer theorem, Reciprocity theorem, Compensation theorem. Analysis with dependent current and voltage sources. Concept of duality and dual networks.

UNIT-II:

Sinusoidal steady state analysis (8 Hours) Representation of sine function as rotating phasor, phasor diagrams, impedances and admittances, AC circuit analysis, effective or RMS values, average power and complex power. Three-phase circuits. Mutual coupled circuits, Dot Convention in coupled circuits.

UNIT-III:

Solution of First and Second order networks (8 Hours) Solution of first and second order differential equations for Series and parallel R-L, R-C, R-L-C circuits, initial and final conditions in network elements, forced and free response, time constants, steady state and transient state response.

UNIT-IV:

Electrical Circuit Analysis Using Laplace Transforms (8 Hours) Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform for standard inputs, convolution integral, transformed network with initial conditions. Series and parallel resonances

UNIT-V:

Two Port Network (8 Hours) Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters and hybrid parameters, interconnections of two port networks.

TEXT / REFERENCE BOOKS:

1) M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.
2) D. Roy Choudhury, "Networks and Systems", New Age International Publications, 1998.
3) W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw Hill Education, 2013.
4) C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education, 2004.
5) K. V. V. Murthy and M. S. Kamath, "Basic Circuit Analysis", Jaico Publishers, 1999.

CO-PO/PSO MAPPING MATRIX:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	1	2	-	-	2	2	2	2	2	3	3
CO2	-	2	-	-	2	-	-	2	2	3	2	2	3	3
CO3	2	-	-	1	2	-	-	2	2	2	2	2	2	3
CO4	-	2	-	1	2	-	-	2	3	2	2	2	3	3
CO5	3	1	3	2	2	-	-	-	2	1	-	1	3	2

EE 115 (R22): PROBLEM SOLVING AND PROGRAMMING WITH C (COMMON TO ALL BRANCHES)

L-3	T-1	P-0	M-100	C-3

COURSE OUTCOMES:

After completion of this course, students will be able to

CO1	Design and develop flowcharts using Raptor to solve simple problems related to basic programming constructs
CO2	Write basic programs in C using different data types, operators, and control structures
CO3	Develop programs using functions and understand concepts like scope, storage classes, and recursion
CO4	Implement programs using arrays, pointers, and strings for solving problems related to data manipulation.
CO5	Understand the concept of structures and files in C programming, and develop programs using structures and file handling functions.

Unit – 1: Flowchart design through Raptor

Flow chart symbols, Input/Output, Assignment, operators, conditional if, repetition, function and sub charts. Example problems(section 1) – Finding maximum of 3 numbers, Unit converters, Interest calculators, multiplication tables, GCD of 2 numbers

Example problems(section 2) - Fibonacci generation, prime number generation. Minimum, Maximum and average of n numbers, Linear search, Binary Search.

Unit 2: C Basics

C-Basics: C-character set, Data types, Constants, Expressions, Structure of C program, Operators and their precedence & associatively, Simple programs in C using all the operators, Type casting, type coercion.

Unit 3: Control Structures and Functions

Control Structures, Basic input and output statements, Preprocessor directives.

Functions: Concept of a function, passing the parameters, automatic variables, scope and extent of variables, storage classes, recursion, iteration vs recursion, types of recursion, Simple recursive and non recursive programs, Towers of Hanoi problem.

Unit 4: Arrays and Pointers

Arrays: Single and multidimensional Arrays, Character array as a string, string functions, Programs using arrays and string manipulation.

Pointers: Pointers declarations, Pointer expressions, Pointer parameters to functions. Pointers, Pointers and array, Pointer arithmetic.

Unit 5: Structures and Files

Structures: Declaring and using structures, operations on structures, structures and arrays, user defined data types, pointers to structures. Command line arguments.

Files: Introduction, file structure, file handling functions, file types, file error handling, Programs using file functions.

TEXT BOOKS:

1) https://raptor.martincarlisle.com/
2) Programming with C-Gottfried-Schaums Outline Series-TMH
3) C Programming – AnithaGoel/Ajay Mittal/E.Sreenivasa Reddy-Pearson India

REFERRENCE BOOKS:

1) Problem Solving with C- Somasekharan-PHI.
2) C Programming- Behrouz A forouzan – CENGAGE Learning
3) Test your c skills-Yaswanthkanithker
4) Let us C- Yaswanthkanithker

CO-PO/PSO MAPPING MATRIX:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	-	2	-	2	-	-	-	-	-	1	1
CO2	2	-	-	2	-	-	-	1	-	2	2	2	2	2
CO3	-	-	2	-	2	2	-	-	-	-	3	3	3	3
CO4	-	2	-	-	2	2	-	-	2	-	3	-	3	3
CO5	1	-	-	2	-	-	-	2	-	-	-	3	1	2
AVG_CO	1	1	1	1	1	1	1	1	1	1	2	2	2	2

EE 116 (R22): ENVIRONMENTAL SCIENCE

L-3	T-0	P-0	M-100	C-0

COURSE OBJECTIVE:

To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

COURSE OUTCOMES:

After completion of this course, students will be able to –

CO1	Gain knowledge about environment and importance of Environmental Studies in the life. They have to know about resources, its importance and environmental impacts of human activities on natural resources.
CO2	Students will learn about the Ecosystem functioning and Importance of biodiversity and its Conservation.
CO3	Gain knowledge about the environmental pollution control, management of waste and pollution related aspects
CO4	Aware students about social issues and natural calamities, constitutional tools provisions for human welfare.
CO5	Students will learn about increase in population growth and its impact on environment and study of different ecosystems through field visit.

UNIT – I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT – II: ECOSYSTEMS, BIODIVERSITY, AND ITS CONSERVATION

ECOSYSTEMS: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans)

BIODIVERSITY AND ITS CONSERVATION : Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III: Environmental Pollution and Solid Waste Management

ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of Air Pollution., Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards

SOLID WASTE MANAGEMENT: Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV: Social Issues and the Environment

SOCIAL ISSUES AND THE ENVIRONMENT: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT – V: Human Population and the Environment

HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion – Family Welfare Programmed – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

FIELD WORK: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

TEXT BOOKS:

1) Text book of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission, Universities Press.
2) Environmental Studies by Palaniswamy – Pearson education
3) Environmental Studies by Dr.S. AzeemUnnisa, Academic Publishing Company

REFERENCE BOOKS:

1) Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications.
2) Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
3) Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.

CO-PO/PSO MAPPING MATRIX:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	C	3	3	1	1	1	1	3	2
CO2	3	2	2	2	2	2	3	3	1	1	1	1	3	2
CO3	3	2	2	2	2	2	3	3	1	1	1	1	3	2
CO4	3	3	2	2	3	2	3	3	1	1	1	1	3	2
CO5	3	3	2	2	3	2	3	3	1	1	1	1	3	2
AVG_CO	3	2	2	2	2	2	3	3	1	1	1	1	3	2

EE 151 (R22): ENGINEERING CHEMISTRY LABORATORY

L-0	T-0	P-3	M-100	C-1.5

COURSE OBJECTIVES:

- To understand technology involved in analysis and improving quality of water as commodity.
- To understand structure, properties and applications of speciality polymers and nano material.
- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
- To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
- To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry.
- To acquire the skills pertaining to spectroscopy and to apply them for medical field etc.

COURSE OUTCOMES:

After completion of this course, students will be able to:

CO1	Explain various methods of volumetric analysis i.e. Redox, Iodometric, complexometric , Neutralization etc. and use of conductivity meter for measurement of conductance of water sample.
CO2	Apply the use of internal and external indicators and their comparison for redox titrations and mechanisms of iodometric titrations and use of double indicator method in a single titration.
CO3	Estimate the % values of moisture, volatile matter, ash and carbon of fuel by Proximate analysis and instrument handling
CO4	Analyse the properties of lubricants viz. Flash & fire point, viscosity, cloud & pour point and their significance.
CO5	Produce a coherent paragraph interpreting a figure/graph/chart/table (L4) Explain synthetic technique of drug like Aspirin, Paracetamol etc.

LIST OF EXPERIMENTS:

1) Determination of hardness of water by EDTA method
2) Estimation of Mohr's salt by Permanganometry
3) Estimation of Mohr's salt by Dicrometry
4) Determination of alkalinity of water
5) Percentage of purity of washing soda
6) Determination of available chlorine in bleaching powder
7) Preparation of Urea-formaldehyde resin
8) Determination on strength of NaoH using HCl conductometrically
9) Acid-Base titration by P^H meter
10) Acid-Base titration by Potentiometer
11) Determination of viscosity of lubricating oil
12) Determination of Surface tension

CO-PO/PSO MAPPING MATRIX:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	1	-	-	-	-	-	-	-	-
CO2	2	-	-	1	-	-	-	-	-	-	-	-
CO3	2	1	-	2	3	-	-	-	-	-	-	-
CO4	2	1	-	2	3	-	-	-	-	-	-	-
CO5	2	-	1	-	-	-	-	-	-	-	-	-

EE 152 (R22): COMMUNICATION SKILLS LAB

L-0	T-0	P-3	M-100	C-1.5

COURSE OBJECTIVES:

- To Improve Pronunciation.
- To Improve LSRW skills
- To Improve both Interpersonal and Intrapersonal Communication.
- To Improve Presentation skills.
- To make them to participate in any social interaction.

COURSE OUTCOMES:

After completion of this course, students will be able to –

CO1	Identify the sounds of English and use of stress and intonation in connected speech
CO2	Able to listen carefully to communicate effectively in cross- cultural contexts
CO3	Capable to make the students communicate in Daily life situations
CO4	Capable to read for content/ main idea.
CO5	Able to communicate confidently in oral presentations

LIST OF ACTIVITIES:

1) Identifying phonic sounds, listening to the sounds, practice and record the sounds from the English learning software
2) Common mispronounced words
3) Listening to the short audios and complete the tasks based on the audios
4) Listening to motivational speeches and answering the questions
5) Comprehending Spoken material in British English & American English
6) Situational Dialogues
7) Role plays
8) Reading comprehension exercises for GRE, TOEFL, GATE etc
9) Reading articles from newspaper
10) Specific reading for enhancing vocabulary
11) Vocabulary building exercises
12) Extempore
13) JAM sessions
14) Small talks
15) Oral presentations

CO-PO/PSO MAPPING MATRIX:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	2	2	-	-	2	3	3	-	3	-	-
CO2	-	-	-	2	2	-	-	2	3	3	-	3	-	-
CO3	-	-	-	2	2	-	-	2	3	3	-	3	-	-
CO4	-	-	-	2	2	-	-	2	3	3	-	3	-	-
CO5	-	-	-	2	2	-	-	2	3	3	-	3	-	-
AVG_CO	-	-	-	2	2	-	-	2	3	3	-	3	-	-

EE 153 (R22): COMPUTER PROGRAMMING USING C LAB

L-0	T-0	P-3	M-100	C-1.5

COURSE OBJECTIVES:

This course provides the fundamental concepts of programming using C language, apply the control structures, iterations statements, arrays, functions, strings, pointers, structures, unions and files. This course also explains the concepts of searching and sorting techniques in C language.

SOFTWARE REQUIREMENTS: Turbo C

COURSE OUTCOMES:

CO 1	Understand and apply fundamental programming concepts such as variables, data types, operators, control structures, functions, arrays, pointers, and structures in C language.
CO 2	Develop efficient algorithms and use appropriate data structures to solve programming problems in C
CO 3	Demonstrate the ability to write and debug C programs using appropriate tools and techniques, including integrated development environments (IDEs) and debugging utilities
CO 4	Evaluate the efficiency and complexity of C programs in terms of time and space complexity, and apply appropriate techniques to optimize program performance.
CO 5	Work collaboratively in teams to develop complex C programs, and effectively communicate technical information and programming solutions to others.

CYCLE 1:

1. Construct flowcharts to
   a) calculate the maximum, minimum and average of N numbers
   b) develop a calculator to convert time, distance, area, volume and temperature from one unit to another.
2. Construct flowcharts with separate procedures to
   a) calculate simple and compound interest for various parameters specified by the user
   b) calculate the greatest common divisor using iteration and recursion for two numbers as specified by the user
3. Construct flowcharts with procedures to
   a) generate first N numbers in the Fibonacci series
   b) generate N Prime numbers.
4. Design a flowchart to perform Linear search on list of N unsorted numbers (Iterative and recursive)

5. Design a flowchart to perform Binary search on list of N sorted numbers (Iterative and recursive)
6. Design a flowchart to determine the number of characters and lines in a text file specified by the user.

CYCLE 2:

1. Exercises on data types and operators?
   a) Practice exercises 3.1 to 3.16 and 4.1 to 4.17 and 14.1 to 14.20 Test your C Skills - yaswanthkanitkar text book.
   b) Write a program which determines the largest and the smallest number that can be stored in different data types of like short, int., long, float and double. What happens when you add 1 to the largest possible integer number that can be stored?
   c) Write a program to find greatest of three numbers using conditional operator?
   d) Write a program to swap two numbers with and without temp variable?
   e) Practice a program using multiple unary increment and decrement operators in arithmetic expressions?
2. Exercises on control structures?
   a) Practice exercise 2.1 to 2.15 Test your C Skills - yaswanthkanitkar text book.
   b) Write a program to find greatest of three numbers? Use nested if, if else if and switch statements?
   c) Write a program to read marks of a student and print the sum and average?
   d) Display the grade based on the sum of marks?
   e) Write a program to count the digits of a number? Use for loop
   f) Write a program to check whether a number is perfect or not? Use do-while
   g) Write a program to check whether a number is strong or not? Use while
   h) Write a program to check whether a number is amstrong or not? Use for
   i) Write a program to check whether a number is palindrome or not? Use for
   j) Write a program to find the Fibonacci series upto the given number? Use while
   k) Write a program to print the pascals triangle? Used do-while
   l) Write a program to print the result of the series 1+x^2/2+x^3/3+….+x^n/n
3. Exercises on functions?
   a) Practice exercise 5.1 to 5.14 Test your C skills -yaswanthkanitkar text book.
   b) Write program to swap two variables using functions? Write a program to perform menu driven arithmetic operations using functions?
   c) Write a program to find the factorial of a number using recursive and non- recursive functions?
   d) Write a program to find the Fibonacci series using recursive functions?
   e) Write a program to find the solution for towers of Hanoi using recursive function?
   f) Write a program to pass parameters to a functions using call by value and call by reference?

4. Exercises on Arrays?
   a) Practice exercise 9.1 to 9.17 Test your C skills - yaswanthkanitkar text book.
   b) Write a program to read n numbers and sort them?
   c) Write a program to find the minimum and maximum numbers of the array?
   d) Write a program to read two matrices and find their sum, difference and product of them?
   e) Find the transpose of a matrix?
   f) Write a program to print upper and lower triangle of a given matrix?
5. Exercises on strings?
   a) Practice exercise 10.1 to 10.15 yaswanthkanitkar text book.
   b) Write a program to demonstrate the use of string manipulation functions?
   c) Write a program to compare two strings?
   d) Write a program to sort the names in Alphabetical order?
6. Exercises on pointers?
   a) Practice exercise 7.1 to 8.26 yaswanthkanitkar text book.
   b) Write a program to read dynamic array and sort the elements?
   c) Write a program to read dynamic array and find the minimum and maximum of the elements?
   d) Write a program to perform pointer arithmetic?
   e) Write a program on pointers for strings?
   f) Write a program to use array of pointers?
7. Exercises on structures?
   a) Practice exercise 11.1 to 11.30 yaswanthkanitkar text book.
   b) Write a program to create student structure and read marks of three subjects and find the sum and total of the student?
   c) Write a program on arrays of structures for 60 students record using the above student structure?
   d) Write a program for complex structure? Perform addition, subtraction and multiplication of two complex numbers?
   e) Write a program for addition and multiplication of two polinomials?
   7. Write a program on Files?
   a) Practice exercise 12.1 to 12.20 yaswanthkanitkar text book.
   b) Write a program to append content of a file?
   c) Write a program to display the content of a file?
   d) Write a program to copy content of one file to other file?
   e) Write a program to count the no of characters in a file?
   f) Write a program to compare the contents of two files?

REFERENCE BOOKS:

1) Test your C Skills by – Yaswanth Kanithkar-BPB Publishers
2) C programming; Test your skills-A.N.Kamthane-Pearson India

CO-PO/PSO MAPPING MATRIX:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	2	2	2	-	-	2	2	2	1
CO2	-	2	2	2	-	-	1	2	-	2	2	2	3	1
CO3	1	-	2	1	-	-	1	-	1	-	2	2	3	1
CO4	2	-	-	2	-	-	-	1	1	2	2	2	3	1
CO5	-	2	1	-	2	-	-	1	-	-	2	2	2	1
CO	1	1	1	1	1	1	1	1	1	1	2	2	2	1

I/IV B.TECH.
SEMESTER II

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING

SEMESTER-II

EE 121 (R22): MATHEMATICS-II

L-3	T-1	P-0	M-100	C-3

COURSE OBJECTIVES:

- To learn about differential equations and its solutions of first and higher order.
- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

COURSE OUTCOMES:

CO 1	Using variable separable method and using other methods solving the higher order differential equation.
CO 2	Reducing the given differential equations and solving for the required solutions.
CO 3	Student should be known about first order partial differential equations and its solutions obtained by using different methods.
CO 4	Student should able to understand about vectors, vector differentiation methods.
CO 5	Student should able to find vector integration by using different methods and also applications of vectors in various fields.

UNIT I: Linear Differential Equations of Higher Order

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.

UNIT II: Equations Reducible to Linear Differential Equations and Applications

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients,

UNIT III: Partial Differential Equations – First order

First order partial differential equations, solutions of first order linear and non-linear PDEs.

Solutions to homogenous and non-homogenous higher order linear partial differential equations.

UNIT IV: Multivariable Calculus (Vector Differentiation) Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT V: Multivariable Calculus (Vector Integration)

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

TEXT BOOKS:

1) Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2) B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

REFERENCE BOOKS:

1) Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2) Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3) George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4) R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5) Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011

CO-PO/PSO MAPPING MATRIX:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	-	-	-	-	-	-	-	2	3	-	-	-
CO2	1	3	-	-	-	-	-	-	-	1	3	-	-	-
CO3	2	3	-	-	-	-	-	-	-	2	2	-	-	-
CO4	2	2	-	-	-	-	-	-	-	3	2	-	-	-
CO5	1	2	-	-	-	-	-	-	-	3	3	-	-	-
AVG_CO	1	2	-	-	-	-	-	-	-	2	3	-	-	-

EE 122 (R22): ENGINEERING PHYSICS

L-3	T-1	P-0	M-100	C-3

COURSE OBJECTIVES:

At the end of the Course/Subject, the students will:

- Understand the phenomena of light- Interference, diffraction, and analyze the differences between interference and diffraction with applications.
- Explain the concepts of lasers and fiber optics and apply them in various fields of engineering.
- Understand the significance of wave function, concepts of classical, quantum free electron theories and classify the materials based on band theory.
- Explain various types of polarizations of dielectrics, classify the magnetic materials and apply the magnetic, dielectric materials for given engineering applications.

COURSE OUTCOMES:

Course Outcome	Course Outcome Statement	Bloom's Taxonomy	Level
CO1	Distinguish the phenomena of light- Interference, diffraction, and determination of the wavelength of given light using these phenomena.	**Remember & understand**	**1 & 2**
CO2	Apply the concepts of light in optical fiber and lasers in communication system. Use of fibers in communication system. Major applications of fibers and Lasers in medical field.	**Application**	**3**
CO3	Classify the magnetic materials and apply the magnetic, dielectric materials for given engineering applications.	**Application**	**3**
CO4	Classify the semiconductors and study the properties of Semiconductors. Hall effect.	**Analyzing**	**4**
CO5	Calculate the energy of quantum particle at different energy levels, de Broglie's hypothesis, Schrodinger's wave function and its applications, study of the properties of superconductors. BCS Theory of Superconductivity	**Analyzing**	**4**

UNIT-I **(10 hrs)**

Interference: Principle of Superposition-Interference of light-Theory of Interference fringes-Conditions for sustained Interference-Interference in thin films by reflected light-Newton's Rings-Determination of Wavelength.

Diffraction: Fraunhofer Diffraction-Single slit Diffraction -Diffraction Grating – Grating Spectrum -Determination of Wavelength.

UNIT-II **(12 hrs)**

Lasers: Laser characteristics, Spontaneous and Stimulated emissions, Basic requirements of a laser, Population inversion – Solid state laser (Ruby laser), Gas (He-Ne) laser, Semiconductor (GaAs) laser, applications of lasers.

Fiber optics: Introduction to Optical Fibers-Principle of optical fiber-Critical angle, Acceptance angle-Numerical Aperture-Classification of fibers based on Refractive index profile, Modes-Propagation of electromagnetic wave through optical fiber - Fiber optic Communication system-applications of Optical fibers.

Unit – III **(14 hrs)**

Dielectrics: Introduction to Dielectrics--Electric polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations-Lorentz (internal) field - Claussius -Mossotti equation.

Magnetics: Introduction to Magnetics-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability-Origin of permanent magnetic moment-Classification of Magnetic materials-Hysteresis-soft and hard magnetic materials- applications of magnetic materials.

Unit – IV: **(12 hrs)**

Semiconductors

Origin of energy band formation in solids-Classification of materials into conductors, semi-conductors & insulators – Semiconductors-Intrinsic semiconductors-dependence of Fermi level on carrier concentration and temperature(Qualitative)- Extrinsic semiconductors - P-type & N-type-dependence of Fermi level on carrier concentration and temperature (Qualitative)- Direct and Indirect band gap semiconductors-Hall effect- applications of Semiconductors.

Unit-V **(12 hrs)**

Principles of Quantum Mechanics: Dual nature of light, Matter waves & properties, de Broglie's concept of matter waves, Davisson and Germer experiment, Heisenberg's uncertainty principle and application (non-existence of electron in nucleus). One dimensional time independent Schrodinger's wave equation, Physical significance of the wave function, Particle in a box (one dimensional).

Superconductivity: First experiment, critical parameters (Tc, Hc, Ic), Meissner effect, BCS Theory (in brief) and Applications of superconductors.

TEXT BOOKS:

1) M.N. Avadhanulu, P.G. Kshirsagar "A Text book of Engineering Physics"- S.Chand Publications,2017
2) H.K. Malik & A.K.Singh "Engineering Physics",- McGraw Hill Publishing Company Ltd, 2018
3) Gaur R.K. and Gupta S.L., "Engineering Physics"- Dhanpat Rai publishers, 2012.

REFERENCE BOOKS:

1) Gerd Keiser "Optical Fiber Communications"- 4/e, Tata McGraw Hill,2008
2) S.M. Sze "Semiconductor devices-Physics and Technology"-Wiley,2008
3) D.K. Bhattacharya and A. Bhaskaran, "Engineering Physics"- Oxford Publications-2015.

CO-PO/PSO MAPPING MATRIX:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-
AVG_CO	3	3	2	-	-	-	-	-	-	-	-	-

EE 123 (R22): ELECTRONIC DEVICES AND CIRCUITS

L-3	T-1	P-0	M-100	C-3

COURSE OUTCOMES:

After completion of this course, students will be able to

CO1	Demonstrate understanding of the characteristic behaviour of various electronic devices such as Diodes, Transistors etc.
CO2	Apply the acquired knowledge in the analysis of various diode and Transistor circuits
CO3	Compare and Contrast the characteristics of BJT and FET in various configurations.
CO4	Evaluate the performance parameters of various diode circuits and Transistor circuits
CO5	Design and analyse amplifier circuits and relate the knowledge of BJT and FET behaviour in the design of various biasing and amplifier circuits.

UNIT I

The PN JUNCTION DIODE: Basic Structure of the PN Junction, Biasing of PN Junction Diode, V-I characteristics of PN junction diode, Diode Current Equation, Effect of temperature on PN junction diodes, Static and Dynamic Resistances, Zener Diode.

Rectifiers: Half Wave, Full Wave and Bridge Rectifier Without Filter and With Filter (Inductor and L-Section).

UNIT II

TRANSISTORS CHARACTERISTICS: The Junction transistor, NPN and PNP transistor operations, Transistor Biasing, Transistor current components, Transistor as an amplifier, Common Base Configuration, Common Emitter Configuration, Common Collector Configuration, Transistor as a switch.

UNIT III

TRANSISTOR BIASING AND STABILIZATION: Need for Biasing, Operating Point, Load lines and Quiescent Point, Fixed Bias Circuit, Self Bias Circuit, Bias Compensation using Diodes and Transistors Stabilization Factors, Stabilization against variations in VBE and β, Thermal Runaway, Thermal Stability .

UNIT IV

JFET Biasing: Biasing Circuits of FET: Fixed Bias Circuit, Voltage Divider Bias Circuit, Self Bias Circuit, Graphical Solution for Self Bias. MOSFET: Depletion MOSFET, Enhancement MOSFET, Comparison of BJT, JFET and MOSFET.

UNIT V

SINGLE STAGE AMPLIFIERS: Small Signal Low Frequency Amplifier Circuits: CE, CB, CC Amplifier Circuits, Small Signal Analysis of Junction Transistor: Analysis of CE, CB, CC using Hybrid Model.

TEXT BOOKS:

1) Jacob Millman, Christos C. Halkias and Satyabrata Jit "Electronic devices and Circuits", 2nd Edition TMH, 1998.
2) Donald A. Neamen, "Semiconductor Physics and Devices", 3rd edition, TMH, 2003
3) Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory, Tenth Edition, PEARSON Publications.

REFERENCE BOOKS:

1) S.Salivahanan, N.Suresh Kumar and A.Vallavaraju, "Electronic Devices and Circuits" 2nd Edition, 2008, TMH.
2) U.A.Bakshi and A.P.Godse "Electronic Devices and Circuits" 1st Edition, 2014, Technical Publications.

CO-PO/PSO MAPPING MATRIX :

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	-	1	1	-	-	2	-	-	-	2	3	1
CO2	2	3	1	3	2	-	-	2	-	-	-	2	3	1
CO3	-	2	-	1	-	-	-	2	-	-	-	2	3	1
CO4	2	3	-	3	2	-	-	2	-	-	-	2	3	1
CO5	3	3	2	3	-	-	-	-	-	-	1	3	2	1
AVG_CO	2	3	2	3	2	-	-	2	-	-	1	2	3	1

EE 124 (R22): ENGINEERING GRAPHICS

L-3	T-1	P-0	M-100	C-3

COURSE OBJECTIVES:

- Developing an understanding of the basic principles and techniques of technical drawing.
- Learning how to use drafting tools and equipment, such as drawing boards, T-squares, and compasses.
- Understanding the different types of lines, dimensions, and scales used in engineering drawing.
- Learning how to create different types of engineering drawings, including orthographic, isometric, and perspective drawings.
- Developing skills in reading and interpreting engineering drawings, including the ability to understand different views and sections.

COURSE OUTCOMES:

1) To understand how to construct and analyze different types of curves used in engineering design and manufacturing to study conic sections, cycloids, helixes, spirals, and involutes.
2) To analyze their drawing skills through regular practice of the different techniques taught in the course, including freehand sketching, orthographic and isometric projections.
3) Applying of their drawing skills through regular practice of the different techniques taught in the course, including orthographic projections, section views, and dimensioning.
4) To understand various topics such as projections of lines in different planes, true length and true inclination of lines, and projection of planes in different planes, true shape and true size of planes, and the concept of auxiliary planes.
5) To evaluate various topics such as sectioning of solids, different types of sections, and the application of sectioning in engineering design and manufacturing. Understand and learn how to use computer-aided design software to create 2D models of solid objects with sections.

UNIT-1

Objective: To introduce the students to use drawing instruments and to draw polygons, Engg. Curves.

Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general and special methods, cycloids, involutes, tangent &normal for the curves. (2L + 6P hrs)

UNIT-2

Objective: To introduce the students to use orthographic projections, projections of points & simple lines. To make the students draw the projections of the lines inclined to both the planes.

Orthographic Projections: Reference plane, importance of reference lines, projections of points in various quadrants.

Projections of straight lines: projections of lines, line parallel to one reference plane and inclined to other reference plane, line inclined to both reference planes, Determination of true lengths, angle of inclination and traces. (2L + 6P hrs)

UNIT-3

Objective: The objective is to make the students draw the projections of the plane inclined to both the planes.

Projections of planes: regular planes perpendicular/parallel to one reference plane and inclined to the other reference plane; inclined to both the reference planes. (2L + 6P hrs)

UNIT-4

Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.

Projections of Solids: Prisms, Pyramids, Cones and Cylinders with the axis inclined to one reference plane & both the reference planes. (2L + 6P hrs)

UNIT-5

Objective: The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

Conversion of isometric views to orthographic views.

Computer Aided Design, Drawing practice using Auto CAD, Creating 2D&3D drawings of objects using Auto CAD. (2L + 6P hrs)

TEXT BOOKS:

1) N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016
2) K.L.Narayana&P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai,2012

REFERENCE BOOKS:

1) Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
2) Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
3) Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000
4) K.C.John, Engineering Graphics, 2/e, PHI, 2013

5) Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.
6) Youtube: http-sewor, Carleton.cag,kardos/88403/drawings.html conic sections-online, red woods.edu.

CO-PO/PSO MAPPING MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2						2	3	3	3
CO2	3	3	3	3	3	2						2	3	3	3
CO3	3	3	3	3	3	2						3	3	3	3
CO4	3	3	3	3	3	2						2	3	3	3
CO5	3	3	3	3	3	2						3	3	3	3
CO6	3	3	3	3	3	2						2	3	3	3

EE 125 (R22): PYTHON PROGRAMMING

L-3	T-1	P-0	M-100	C-3

COURSE OBJECTIVES:

This course enables the students to understand the fundamentals of python programming, describe the various operators and control flow statements, analyse various data structures, make use of functions, discuss about MODULE s, packages in python, object oriented concepts, exception handling, illustrate advanced concepts like multithreading, graphics and generate various test cases.

COURSE OUTCOMES:

After completion of this course, students will be able to –

CO1	Understand the basic building blocks in python programming language to construct different applications.
CO2	Apply the necessary data structures to solve a given problem
CO3	Extract and import packages for developing different solutions for real time problems.
CO4	Implement the problems in terms of real -world objects using concept of OOPS.

Unit 1:

Context of software development: Software, Development tools, Learning programming with Python, Writing a python program.

Values and Variables: Variables and assignments, identifier, Control codes within Strings, User Input, The eval function, the print function.

Expressions and Arithmetic: Expressions, Operator precedence and Associativity, Comments, Errors, More arithmetic operators.

Unit 2:

Conditional Execution: Boolean Expressions, Simple if and if else, nested conditionals, multiway decision statements, conditional expressions, errors in conditional statements.

Iteration: While statements, for statement, definite loops and indefinite loops, nested loops, abnormal loop termination, infinite loops, iteration examples: computing square root, drawing a tree, printing prime numbers.

Unit 3:

Functions: Introduction, standard mathematical functions, time functions, Random numbers, main function, parameter passing, Function examples: Better organized prime number, Command Interpreter, Restricted Input, Better Die rolling simulator, Tree-Drawing Function, Floating –Point equality, Custom functions Vs Standard functions.

More on Functions: Global variables, Default Parameters, recursion, Making functions reusable, documenting functions and modules, functions as data.

Unit 4:

Lists: Using Lists, List assignment and equivalence, list bounds, Slicing, Lists and functions, Prime generation with a list

Lists processing: Sorting, flexible sorting, search, list permutations, randomly permuting a list, reversing a list.

Unit 5:

Objects: Using Objects, String Objects, List Objects.

Custom types: geometric points, Methods, Custom type examples, Class inheritance.

Handling Exceptions: Motivation, Exception examples, Using Exceptions, Custom Exceptions.

TEXT BOOKS:

1) Learning to program with python richard l. Halterman
2) Core Python Programming by Dr. R.Nageswara Rao, dreamtech, second edition

CO-PO/PSO MAPPING MATRIX:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	2	-	-	3	2	1
CO2	2	2	2	-	-	-	-	-	2	-	-	3	1	2
CO3	2	2	2	-	-	-	-	-	2	-	-	3	3	2
CO4	2	2	2	-	-	-	-	-	2	-	-	3	3	1
AVG_CO	2	2	2	-	-	-	-	-	2	-	-	3	2	2

EE 161 (R22): ENGINEERING PHYSICS LABORATORY

L-0	T-0	P-3	M-100	C-1.5

COURSE OUTCOMES:

After completion of this course, students will be able to –

CO1	Examine the physical properties of light using interference and diffraction.
CO2	Calculate the numerical aperture and acceptance angle of optical fiber
CO3	Analyze the characteristics of semiconducting material
CO4	Demonstrate the magnetizing behavior of magnetic materials
CO5	Calculate the dielectric constant of a material

LIST OF PHYSICS EXPERIMENTS:

1) Determination of the radius of curvature of the lens by Newton's ring method.
2) Determination of wavelength by plane diffraction grating method.
3) Dispersive power of a Prism.
4) Resolving power of a grating.
5) Photo cell – I-V Characteristic curves and determination of stopping potential.
6) Magnetic field along the axis of a circular coil carrying current.
7) B-H Curve
8) To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle.
9) Hall Effect.
10) Photo voltaic cell - Determination of fill-factor.
11) To determine the energy gap of a semiconductor.
12) Determination of Acceleration due to gravity by using compound Pendulum.
13) Poisson's ratio of aluminium and rubber.
14) Rigidity modulus of material by wire-dynamic method (torsional pendulum).
15) Determination of a.c. Frequency – Sonometer.
16) Determine the wavelength of Laser source.

CO-PO/PSO MAPPING MATRIX:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	3	-	-	-	3	-	-	-	-	-
CO2	3	-	-	-	3	-	-	-	3	-	-	-	-	-
CO3	3	3	-	-	3	-	-	-	3	-	-	-	-	-
CO4	3	-	-	-	3	-	-	-	3	-	-	-	-	-
CO5	3	-	-	-	3	-	-	-	3	-	-	-	-	-
AVG_CO	3	1	-	-	3	-	-	-	3	-	-	-	-	-

EE 162 (R22): ELECTRONIC DEVICES AND CIRCUITS LAB

L-0	T-0	P-3	M-100	C-1.5

COURSE OUTCOMES:

After completion of this course, students will be able to –

CO1	Demonstrate the characteristic behaviour of PN junction diode, Zener diode and special purpose semiconductor diodes
CO2	Examine the characteristics of BJT and FET in various configurations.
CO3	Examine the characteristics of MOSFET in various configurations.
CO4	Evaluate and compare the significant parameters obtained from the characteristics of BJT and FET, and MOSFET
CO5	Design various BJT biasing circuits to identify the appropriate circuit for faithful amplification.

LIST OF LAB EXPERIMENTS

1) Characteristics of Silicon and Germanium diodes
2) Characteristics of Zener diode and its regulation characteristics are
3) Characteristics of BJT in Common Base configuration.
4) Characteristics of BJT in Common Emitter configuration.
5) Characteristics of Emitter follower circuit. .
6) Output and Transfer Characteristics of JFET
7) Characteristics of UJT.
8) Design and verification of self-bias circuit for BJT.
9) Design and verification of collector to base bias circuit for BJT.
10) Design and verification of Fixed bias circuit for BJT.
11) Characteristics of LED
12) Design and verify Half wave rectifier with and without filter
13) Study of CRO.
14) Design and verify Full wave rectifier with and without filter
15) Characteristics of Photo Transistor

CO-PO/PSO MAPPING MATRIX:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	1	2	-	-	2	2	2	2	2	3	3
CO2	2	2	-	1	2	-	-	2	2	2	2	2	3	3
CO3	2	2	-	1	2	-	-	2	2	2	2	2	3	3
CO4	2	2	-	1	2	-	-	2	2	2	2	2	3	3
CO5	2	1	3	2	2	-	-	-	2	1	-	1	3	2
AVG_CO	**2**	2	3	2	**2**	**-**	**-**	**2**	2	2	2	**2**	**3**	3

EE 163 (R22): PYTHON PROGRAMMING LAB

L-0	T-0	P-3	M-100	C-1.5

COURSE OBJECTIVE:

- This course enables the students to develop various applications using python

COURSE OUTCOMES:

After completion of this course, students will be able to –

CO1	Implement python programming constructs to build small to large scale applications.
CO2	Implement the problems in terms of real -world objects using OOPs technology.
CO3	Evaluate and handle the errors during runtime involved in a program
CO4	Extract and import packages for developing different solutions for real time problems.

LIST OF ACTIVITIES:

1) Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
2) Design a Python script to determine if a given string is a Palindrome using recursion
3) Design a Python script to sort numbers specified in a text file using lists.
4) Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format(0 <= YYYY <= 9999, 1 <= MM <= 12, 1 <= DD <= 31) following the leap year rules.
5) Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
6) Design a Python Script to determine the time difference between two given times in HH:MM:SS format.(0 <= HH <= 23, 0 <= MM <= 59, 0 <= SS <= 59)
7) Design a Python Script to find the value of (Sine, Cosine, Log, PI, *e*) of a given number using infinite series of the function.
8) Design a Python Script to convert a given number to words
9) Design a Python Script to convert a given number to roman number.
10) Design a Python Script to generate the frequency count of words in a text file.
11) Design a Python Script to print a spiral pattern for a 2 dimensional matrix.
12) Design a Python Script to implement Gaussian Elimination method.
13) Design a Python script to generate statistical reports (Minimum, Maximum, Count, Average, Sum etc) on public datasets.

14) Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class and failed.

15) Design a Python script to search an element in the given list.

16) Design a Python script on *str* methods and *list* methods.

CO-PO/PSO MAPPING MATRIX:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	2	-	-	-	-	-	2	-	-	3	2	1
CO2	3	2	2	-	-	-	-	-	2	-	-	3	1	2
CO3	2	2	2	-	-	-	-	-	2	-	-	3	3	2
CO4	2	2	2	-	-	-	-	-	2	-	-	3	3	1
AVG_CO	2	2	2	-	-	-	-	-	2	-	-	3	2	1

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