ANNAMACHARYA UNIVERSITY

(Estd A.P. Private Universities (Establishment and Regulation) Act, 2016)

RAJAMPET-516126, Annamayya District, A.P, INDIA

ACADEMIC REGULATIONS (AU24), COURSE STRUCTURE AND SYLLABI

For the students admitted to

B. Tech., Regular Four-Year Undergraduate Degree Programme from the Academic Year 2024-25, B.Tech., Honors and Minors

and

B. Tech., Lateral Entry Scheme from the Academic Year 2025-26

VISION AND MISSION OF THE UNIVERSITY

VISION

To be a globally recognized university by providing value-based education and promoting innovation and research for societal betterment

MISSION

The mission of the University is:

1. To embody ‘Vidwan Sarvatra Pujyathey’.
2. To deliver high-quality education by encouraging research, innovation, and critical thinking
3. To nurture upright individuals by fostering an inclusive environment and inspiring service to society

ACADEMIC RULES AND REGULATIONS OF FOUR-YEAR B. TECH REGULAR DEGREE PROGRAMME

APPLICABLE FOR THE STUDENT BATCHES ADMITTED FROM THE ACADEMIC YEAR 2024-25
APPLICABLE FOR THE STUDENTS (Lateral Entry) ADMITTED FROM THE ACADEMIC YEAR 2025-26

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1. PREAMBLE

Annamacharya University, is a private University, established under the brownfield category as per the Andhra Pradesh Private Universities (Establishment and Regulation) Act of 2016 (Act No. 3 of 2016), subsequently amended by Act No. 2 of 2024, as published in the Extraordinary Gazette of Andhra Pradesh via gazette notification G.O.Ms. No. 13 dated 13.03.2024. The University Grants Commission (UGC) has included it in the list of UGC-listed Universities vide letter no. xxx dated xx.08.2024.

Annamacharya University, Rajampet, relentlessly aims to achieve academic excellence by implementing new initiatives in teaching-learning and evaluation processes. Based on the directions of the University Grants Commission (UGC), New Delhi, All India Council for Technical Education (AICTE), New Delhi, Department of Higher Education, Government of Andhra Pradesh, and Andhra Pradesh State Council of Higher Education (APSCHE), the university has adopted the AICTE and APSCHE model curriculum with minor modifications to match the needs, expectations, and skill sets of students in the state, in both the undergraduate and postgraduate programs offered from the academic year 2024-25.

Annamacharya University is promoting enhanced learning abilities through the integration of various skills into the curriculum, including (a) Critical Thinking, (b) Problem Solving, (c) Analytical Reasoning, (d) Scientific Reasoning, (e) Reflective Thinking, and (f) Design Thinking etc.,

Objectives:

The objectives of offering the B. Tech program are:

1. To empower students to focus on conceptual and empirical engineering knowledge.
2. To encourage a multidisciplinary perspective.
3. To encourage depth and breadth in understanding complex issues.
4. To provide broad interdisciplinary training with a well-sequenced curriculum over a sufficient length of time, giving students adequate preparation in their chosen field, either for higher studies or professional career.

Academic Council:

The academic council in a private university plays a pivotal role in maintaining and enhancing the academic standards and quality of education. The academic council coordinates and exercises general supervision over the academic policies of the university.

The Department Board of Studies (BoS):

Each department within the School of Engineering will have a Board of Studies common to the UG, PG, and Doctoral programs offered by the department. The Dean/Head of the department will serve as the Chairman of the Department Board of Studies. The Board of Studies has been constituted as per the guidelines of the university statutes. The rules, regulations, curriculum, syllabus, and other academic matters shall be approved by the Board of Studies before being placed in the Academic Council and subsequently the Board of Management.

Office of the Dean, Academics:

The office of the Dean, Academics, is responsible for the implementation of the decisions taken on academic matters by the Academic Council. The office:

- Receives, processes, and maintains all records relating to the programs, including curricula, courses offered, academic calendar, registration, assessments, and grades.
- Disseminates information pertaining to all academic matters, issues necessary memoranda/orders, and acts as a channel of communication between the students, instructors, and departments.
- Provides information about various academic programs, rules, and regulations to students.

2. REGULATIONS COMMENCEMENT

- The regulations are quite comprehensive and include definitions of key terms, semester system, credit system, grading system, and other relevant details.
- The regulations detailed herein shall apply to all the regular under-graduate programmes offered by the University.
- The regulations shall be applicable and come into force to the student batches admitted from the academic year 2024-25 and Lateral Entry students admitted from the academic year 2025-26.

- The University may revise, amend or change the regulations, scheme of examinations and syllabi, from time to time, if found necessary and on approval by the Academic Council of the University, keeping the recommendations of the Board of Studies (BoS) in view.
- Any or all such amendments shall be effective from such date and to such batches of students including those already undergoing the programme, as may be approved through Academic Council of the University.
- These regulations shall be called AU24 Regulations.

3. ELIGIBILITY FOR ADMISSION

3.1 Admission into Engineering Under Graduation Programmes (Regular)

The eligibility criteria for admission into engineering undergraduate programmes offered at Annamacharya University shall be as prescribed by Statutes and Ordinances of the University and Higher Education Department, the Government of Andhra Pradesh. The criteria are given below:

- The candidate shall be an Indian National / NRI.
- The candidate should have completed 16 years of age as on 31st December of the academic year for which the admissions are being conducted.
- The candidate should have passed the qualifying examination (10+2) or equivalent as on the date of admission recognized by Board of Intermediate, Andhra Pradesh.
- Seats in each programme in the University are classified into two categories i.e., **Brownfield** and **Greenfield**. Further under brownfield category seats are filled through two categories, i.e., **Category – A** and **Category – B** as per the GOs of Andhra Pradesh.

  BROWNFIELD CATEGORY:

  The existing institution is converted into a brownfield university. The admission of students into the existing approved intake will be regulated by the admission rules and seat-sharing policies applicable to the University, as defined under Section 2(4-A) of the Andhra Pradesh Private Universities (Establishment and Regulation) Act, 2016. This means that 70% of the seats in the existing courses at the university will be filled through the convener of EAPCET. In this category, the seats are filled through Convener quota / Category – A and Management Quota / Category – B.

Category – A Seats (70% of seats)

These seats shall be filled through counselling as per the rank secured by a candidate in the Common Entrance Test (EAPCET) conducted by the Government of Andhra Pradesh and as per other admission criteria laid down in the GOs.

Category – B Seats (30% of seats):

These seats shall be filled by the University through AUET and the GOs issued by the Government of Andhra Pradesh from time to time. Annamacharya University Entrance Test (AUET) is conducted across India for those seeking admission to Engineering programmes offered by Annamacharya University. The eligibility criteria for appearing for AUET, the format, and other details will be specified in the application form and will be determined by the Office of the Director, Admission, Annamacharya University for the respective year of admissions.

GREENFIELD CATEGORY:

Furthermore, the admission rules for the brownfield university regarding any additional intake, new courses, or additional courses approved after conversion shall follow the regulations applicable to a greenfield university.

The university shall reserve 35% of seats in engineering, science, and other programs for the Government Quota and admit students in accordance with the rules prescribed for any additional intake in existing programs, as per the Andhra Pradesh Private Universities (Establishment and Regulation) Act, 2016.

Category – A Seats (35% of seats)

These seats shall be filled through counselling as per the rank secured by a candidate in the Common Entrance Test (EAPCET) conducted by the Government of Andhra Pradesh and as per other admission criteria laid down in the GOs.

Category – B Seats (65% of seats):

These seats shall be filled by the University through AUET and the GOs issued by the Government of Andhra Pradesh from time to time. Annamacharya University Entrance Test (AUET) is conducted across India for those seeking admission to Engineering programmes offered by Annamacharya University. The eligibility criteria for appearing for AUET, the format, and other details will be specified in the application form and will be determined by the Office of the Director, Admission, Annamacharya University for the respective year of admissions.

3.2 Admission into Second Year (Lateral Entry Scheme)

A candidate shall be admitted into the third semester (II year I semester) based on the rank secured by the candidate in the Engineering Common Entrance Test (ECET) by the Government of Andhra Pradesh and AUET examination conducted by university as per other admission criteria laid down in the Ordinances and Principal Act.

3.2 Authority for Admission:

Any matter related to admission to the B.Tech., programme, the decision of the Office of the Director, Admissions is final.

3.3 Revoking / Cancellation of Admission:

All students admitted provisionally to any program must submit copies of their original mark sheets, provisional certificates, and any other documents required by the Director of Admissions by the last date specified in the Academic Calendar of Annamacharya University.

The Registrar, based on the recommendation of the Director of Admissions, may cancel the admission of any student who fails to submit the prescribed documents by the specified date or does not meet other stipulated requirements. Additionally, the Registrar may cancel the admission later if it is discovered that the student provided false information, suppressed information, misrepresented facts, or forged documents while seeking admission or thereafter, and report the matter to the Vice Chancellor.

4. MEDIUM OF INSTRUCTION

The medium of instruction shall be **English** for all the courses including their content delivery and examinations, seminars, presentations, and project evaluation as prescribed in the programme curriculum.

5. B.TECH. PROGRAMME STRUCTURE

The structure of the B.Tech. Programmes on offer at Annamacharya University are based on the **Choice Based Credit System (CBCS)** as defined by the UGC and the curriculum / course structure as suggested by the AICTE, UGC and APSCHE in its Model Curriculum.

Semester Scheme

- The B. Tech Programmes offered at Annamacharya University follow **semester scheme** pattern.
- The duration of a B. Tech. Programme shall be of **4 academic** years for 4-year B. Tech programmes **and 3 academic years** for 3-year B. Tech programmes in lateral entry scheme**.**
- Each academic year shall have **2 semesters** i.e., odd and even semesters and shall be counted as I Year I Semester, I Year II Semester, and II Year I Semester and so on up to IV Year II semester.
- Each semester shall consist of 16 weeks of instructions.
- Each semester is structured to provide credits totalling to **160 credits** for the entire B.Tech. Programme.
- Each semester shall have **Continuous Internal Evaluation (CIE)** and **Semester End Examination (SEE)** for both Theory and Lab courses.
- Each student is required to secure a total of **160 credits with a CGPA ≥ 5** for the completion of the UG programme and the award of the B.Tech. Degree.
- A student after securing admission into a 4-year B. Tech Programme at Annamacharya University shall pursue and acquire the B.Tech. degree in a **minimum period of four academic years i.e., 8 semesters** and a **maximum period of eight academic years i.e., 16 semesters** starting from the date of commencement of I year I semester, failing which the student shall forfeit the seat in B.Tech. Programme.
- A student after securing admission into a 3-year B. Tech Programme (Lateral Entry) at Annamacharya University shall pursue and acquire the B.Tech. Degree in a **minimum period of three academic years i.e., 6 semesters** and a **maximum period of six academic years i.e., 12 semesters** starting from the date of commencement of II year I semester, failing which the student shall forfeit the seat in B.Tech. programme.
- University shall take measures to implement Virtual Labs (https://www.vlab.co.in) which provide remote access to labs in various disciplines of Engineering and will help student in learning basic and advanced concept through remote experimentation. Student shall be made to work on virtual lab experiments during the regular labs.

6. PROGRAMMES OFFERED BY THE UNIVERSITY

The following B. Tech. programmes are offered as specializations by the University from the 2024-25.

SNo	Name of the Program	Programme Code
1	Civil Engineering	CIV
2	Electrical and Electronics Engineering	EEE
3	Mechanical Engineering	MEC
4	Electronics and Communication Engineering	ECE
5	Computer Sciences and Engineering	CSE
6	Artificial Intelligence and Data Science	AID
7	Artificial Intelligence and Machine Learning	AIM
8	Computer Science and Engineering (Artificial Intelligence)	CSI
9	Computer Science and Engineering (Data Science)	CSD
10	CSE (Artificial Intelligence and Machine Learning)	CSM
11	CSE (Internet of Things and Cyber Security including Block Chain Technology	CIC

7. COURSES AND CREDIT STRUCTURE

Credit: A credit is a unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (Lecture/Tutorial) or two hours of practical work/field work/project per week.

Academic Year: Two consecutive (one odd + one even) semesters constitute one academic year.

Choice Based Credit System (CBCS): CBCS provides choice for students to select from the prescribed courses.

Each course is assigned certain number of credits based on following criterion.

Type of Class	Semester	
	Periods per Week	Credits
Theory (Lecture/Tutorial)	01	01
	02	02
Practical	02	01
	03	1.5
	04	02
Project Work / Internship	-	16

Every course of the B. Tech. programme shall be offered by a specific section / department. The unique codes of the section / department offering the courses are given in the Table.

Course offering Department	Code
Basic Science Courses	Mathematics – MAT Physics – PHY Chemistry -CHE English – ENG
Humanities and Social Science Courses including Management Courses	HSMC
Civil Engineering	CIV
Electrical and Electronics Engineering	EEE
Mechanical Engineering	MEC
Electronics & Communication Engineering	ECE
Computer Science & Engineering	CSE
Artificial Intelligence and Data Science	AID
Computer Science and Engineering (Artificial Intelligence)	AIM
Computer Science and Engineering (Data Science)	CSI
Artificial Intelligence and Machine Learning	CSD
CSE (Internet of Things and Cyber Security including Block Chain Technology	CIC

Every B. Tech. Programme of study shall be designed to have theory and laboratory courses. In addition, a student shall carry out internship, project, socially relevant project, and other mandatory courses as prescribed in the curriculum of the Programmes.

7.1 Types of Courses:

TYPE OF COURSES	COURSE CATEGORY	CODE	Credit Distribution	Percentage of Total Credits (%)	ACITE Recommendation (%)
Foundation	Engineering Sciences	ESC	23.5	14	10-18
	Basic Sciences	BS	20	13	12-16
	Humanities & Social Sciences and Management	HSM	13	8	8-9
Core	Professional Core	PC	54.5	34	30-36
Project	Project (12)	PROJ	16	10	8-11
	Internship (4)				
Elective courses	Professional Elective	PE	33	21	19-23
	Open Elective (Including two MOOCs)	OE			
	Domain Specific Skill Oriented Courses	SEC			
Mandatory Courses	Mandatory	MC	-	-	-
Total Credits			160	100	100

7.1.1 Foundation Courses

Engineering Science courses, Basic Science Courses and Humanities courses are termed as Foundation Courses and are mostly offered at I and II Year.

7.1.2 Professional Core Courses

Professional Core Course is to be completed by all students of respective programme before they can move on to the next semester.

7.1.3 Professional Core Electives

University Grants Commission has come up with the Choice Based Credit System (CBCS) in which the students have a choice to choose from the prescribed courses, which are referred as Professional elective and Open Elective courses. All the Professional and Open elective courses shall be offered for 3 credits.

Students have to register for a total of 5 professional core electives courses (PE-1 to PE-5) from the list of track-wise professional elective course as prescribed in the course structure of the programme. The following points are considered for a Professional Elective Course.

- Maximum strength of a class /section for each semester shall be 72.
- A course may be offered to the students, only if a minimum of 24 students (1/3 of the section strength) opts for it.
- The selection of course based on the choice for students shall be on 'first come first serve' through online and offline registration.
- The Head of the department or concerned shall decide, whether or not to offer such course keeping in view the resources available in the department offering the course.

7.1.4 Open Electives

Choice Based Credit System (CBCS) is promoted in such a way that different open elective courses should be offered by every department in engineering to other departments. This interdisciplinary of learning open elective courses by other department students will have learning awareness and job-oriented benefits. Students will have the opportunity to choose any open elective course from different departments and apply their knowledge to acquire jobs in that field of course. Learning and employment benefits are not only through their own course subjects but also through open elective courses.

Every student shall earn prescribed credits by choosing one of the open elective courses from the list of Open Electives given in the Curriculum. Two Open electives (OE1 & OE2) are to be

chosen from the repository of **inter-disciplinary MOOCs** courses offered by NPTEL or any other recognized Institutions/Organization. Students shall consult their mentors before opting for an open elective course (MOOCs).

Further students from a particular program/branch can opt for one Open Elective (OE3) offered by their concerned department. However, one Open Electives (OE4) is inter-disciplinary and shall be offered by other branches.

The following guidelines are pertaining to Open Elective Courses.

- Maximum strength of a class /section for each semester shall be 72.
- A course may be offered to the students, only if a minimum of 24 students (1/3 of the section strength) opts for it. The minimum number of students is required to register the course to offer opted course in the department.
- The selection of course based on the choice for students shall be on 'first come first serve' through online and offline registration.
- The Head of the department or concerned shall decide, whether or not to offer such course keeping in view the resources available in the department offering the course.

7.1.5 Massive Open Online Courses as Open Elective

- MOOCs (Massive Open Online Courses) are introduced to meet with the global requirements and to inculcate the habit of self-learning and in compliance with the UGC guidelines.
- A student shall be permitted to pursue up to a maximum of two electives courses under MOOCs during programme. Each of courses must be of minimum 12 weeks in duration.
- Concerned departments **shall declare the list of inter-disciplinary** courses that a student can pursue through MOOCs at the beginning of the corresponding semester.
- Students interested in pursuing MOOCs shall register for the course and submit this information at their department office at the start of the corresponding semester.
- Course content for the selected MOOCs shall be drawn from the respective MOOCs offering Portal.
- Course progress shall be monitored by the Mentors designated by the Dean / HoD.
- Grade obtained through the evaluation of the MOOC shall be considered for the CGPA calculation.
- Three credits shall be awarded to the student upon successful completion of MOOC.

- In case a student fails to complete the MOOCs he/she shall re-register for the same with the same provider, already offered that course. In case that provider discontinues to offer the course, University shall conduct an offline examination in the same format, which student already appeared in online examination, as per the MOOCs syllabus.

7.1.6 Skill Oriented Courses / Skill Advanced courses

- There shall be 4 skill-oriented courses offered during 3rd to 7th semester. Among the 4 skill-oriented courses, 3 courses shall focus on the basic to advanced skills related to the domain courses and remaining 1 shall be a soft skills course.
- Skill oriented / skill advanced courses carry 2 credits
- For skill oriented/skill advanced course, 1 theory and 2 practical hours may be allotted as per the decision of concerned BOS.
- Out of the 4 skill courses, 2 skill courses shall be skill-oriented courses from the same domain and shall be completed in 2nd year. Of the remaining 2 skills courses, 1 shall necessarily be a soft skill course and the remaining, 1 shall be skill advanced course either from the same domain or job-oriented skill course, which can be of inter-disciplinary nature.
- A pool of interdisciplinary job-oriented skill courses shall be designed by a common Board of studies by the participating departments and the syllabus along with the pre-requisites shall be prepared for each of the laboratory infrastructure requirements.
- The student shall be given an option to choose either the skill courses being offered by the university or to choose a certificate course being offered by Industries/Professional Bodies/ APSSDC or any other accredited bodies as approved by the concerned BOS.
- If a student chooses to take a certificate course offered by Industries / Professional Bodies / APSSDC or any other accredited bodies, in lieu of the skill advanced course offered by the department, the credits shall be awarded to the student upon producing the course completion certificate from Industries/Professional Bodies/ APSSDC as approved by the concerned BOS.
- If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill oriented course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the

concerned BOS, the student is deemed to have fulfilled the attendance requirements of the course and acquire the credits assigned to the course.

- A committee shall be formed at the level of the University to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades. The recommended conversions and appropriate grades/marks are to be approved by the Academic Council of the University.

7.1.7 Mandatory Courses

Courses such as Environmental Sciences, Gender sensitization, and Technical Paper Writing & IPR are offered as non-credit mandatory courses for all the undergraduate students.

- A student shall pursue mandatory courses as specified in the course structure of the B.Tech. Programme.
- These courses are among the compulsory courses and do not carry any credits.
- A student has to secure 40 marks out of 100 in the Internal Examination, shall be necessary requirement for the student to qualify for the **award of Degree**.
- Result of mandatory courses shall be declared with **"Pass"** or **"Fail"** performance in the Comprehensive Marks Memo.
- No marks or letter grade shall be allotted.
- Attendance in the mandatory course shall be considered while calculating aggregate attendance.

7.1.8 Universal Human Values (UHV) Courses

- Universal Human Values-I shall be a mandatory student Induction Programme with no credits for freshers, with a two / three - week duration before the commencement of first semester. Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations etc., are included as per the guidelines issued by UGC and AICTE.
- The Universal Human Values-II course carries 3 credits. The assessment is to provide a fair state of development of the student, so participation in classroom discussions, self-assessment, peer assessment etc. will be used in evaluation.

- A student must secure 40% marks out of 100 in the CIE and SEE together to qualify for the award of the degree. The distribution shall be 50 marks for continuous internal assessment and 50 marks for semester end examination.
- Internal evaluation shall be conducted for the course during semester and shall be evaluated for 50 marks and distributions of marks as follows:
    - Assessment by faculty mentor: 10 marks
    - Self-assessment: 10 marks
    - Assessment by peers: 10 marks
    - Socially relevant project/Group Activities/Assignments: 20 marks

7.1.9 Language Elective

- The Language Elective course carries 1 credit. Students must register for either German, French, Spanish, or Arabic based on their choice and complete the online certificate course in the semester it is offered. One hour is allocated in the regular timetable, and the teacher will guide the students, if they encounter any difficulties during the course. Evaluation will include participation in classroom discussions, self-assessment only.
- The course will be graded on a Pass/Fail basis. A pass grade is awarded upon verification of the completion certificate.
- Failure to complete the course within the stipulated time frame will result in no credit being awarded, and the elective will need to be retaken.
- A committee shall be formed at the level of the University to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades. The recommended conversions and appropriate grades/marks are to be approved by the Academic Council of the University.

8. Evaluation Process

The performance of a student in each semester shall be evaluated course-wise with a maximum of 100 marks for both Theory and Lab Course.

- For a Theory course, the distribution shall be 40 marks for Internal Evaluation and 60 marks for End-Evaluation. The distribution is detailed in 8.1.1.
- For a Lab course, the distribution shall be 40 marks for Internal Evaluation and 60 marks End- Evaluations. The distribution is detailed in 8.1.3
- Project Work shall be evaluated for 200 marks. Mandatory courses with no credits shall be evaluated for 100 marks.

8.1 Internal Evaluation

For a Theory Course, 40 marks are allotted for Internal Evaluation. Two Internal examinations (Theory Internal Examinations) shall be conducted for a Theory Course during a semester, and they shall be evaluated for 40 marks of which 30 marks are given for Continuous Internal Examination and 10 marks for assignment. For Lab Course, there shall be a continuous internal evaluation during the semester for 40 marks.

8.1.1 Theory Internal Evaluation

Theory Continuous internal examination shall have Part A & Part B. In Part A, which is compulsory, five short answer questions each of which carries 1 mark. There shall be no sub-questions or bits. The examination shall be conducted for 2 hours.

Part B shall contain three either or type questions (Total six questions from 1 to 6). Each question shall carry 10 marks. 30 marks allotted for Part B shall finally be scaled down to 25 marks. The questions shall be set/ moderated such that the student can comfortably answer each question within the stipulated time.

Question paper pattern for Continuous Internal Examination (30 Marks) shall be as follows:

PART A: Five short answer questions - 5 x 1 = 5 Marks

PART B: 30 Marks (will be scaled to 25 marks)

(i) There shall be three questions with internal Choice i.e., 'either' or 'choice.'

(ii) The student shall answer three questions.

First Theory Continuous Internal examination shall be conducted as per the syllabus of I & II units. The second Continuous internal examination shall be conducted as per the syllabus of III, IV and V units. 80% weightage for the best performance and 20% the other shall be considered. Final value shall be rounded up.

For Example:

Marks obtained in I Internal examination: 19

Marks obtained in II Internal examination: 10

Final Internal Marks: (19x0.8) + (10x0.2) = 17.2

If the student is absent for any one Internal examination, the final internal marks shall be arrived at by considering 80% weightage to the marks secured by the student in the appeared examination and zero to the other.

For Example:

Marks obtained in first Internal: 0 (Absent); Marks obtained in second Internal: 18

Final Internal Marks: (18x0.8) + (0x0.2) = 14.4

For course namely, Engineering Graphics / Engineering Drawing, the distribution of internal evaluation and external evaluation marks shall be 40 and 60, respectively.

Of the 40 internal evaluation marks, day-to-day performance of the student shall be evaluated for 20 marks, and the examination shall carry 20 marks. Day-to-day work shall be evaluated by the concerned teacher based on the exercises, submissions, and assignments prepared in the class. Two examinations shall be conducted in a semester, each with a duration of 2 hours. Each examination is for 10 marks, with a weightage of 80% for the better of the two and 20% for the other. The sum of day-to-day work and the examination marks will be the final day-to-day evaluation for 40 marks for the subject. The final evaluation shall be for 60 marks and is of 3 hours duration, conducted internally. The question paper shall consist of 5 questions, one from each unit, with internal choice. All questions carry 12 marks each.

8.1.2 Assignment (Theory)

The assignment shall contain essay-type numerical questions, out-of-the-box thinking questions, etc. The assignments are given by the concerned teacher for 10 marks from the first two units.

The second assignment shall be given from the rest of the syllabus. The first assignment should be submitted before the first internal examination, and the second assignment should be submitted before the second internal examination. The number of questions is limited to 5, and teachers should frame the questions by considering all Course Outcomes. There shall be at least two assignments in a semester, and the average performance of the two assignments will be considered.

8.1.3 Lab Internal Evaluation

Out of the 40 marks allotted for Lab Internal Evaluation, day-to-day performance of the student in the laboratory shall be evaluated for 20 marks by the concerned laboratory teacher based on experimental evaluation/record/viva. Two Lab Internal examinations shall be conducted for 20 marks by the concerned teacher. Performance of one best out of two tests to be considered. The day-to-day marks distributed as follows:

- Observation : 5 Marks
- Record : 5 Marks
- Performing the experiment / Program / Activity : 10 Marks

8.1.4 Internal Evaluation of Mandatory Courses

Mandatory courses are offered with no credits. However, a student has to complete Mandatory Courses in order to be eligible for the award of the Degree. There shall be a Continuous Internal Examination for 100 marks. A student shall be declared to have passed the mandatory course only when he/she secures 40% or more in the internal examination. In case, the student fails, a supplementary examination shall be conducted.

8.1.5 Make-up Internal Examination

The student who has missed both the Theory Continuous Internal examinations will be permitted to appear for a Make-up Continuous Internal examination in the event of his/her producing satisfactory evidence of medical sickness. One Make-up internal test shall be conducted immediately after the II Continuous Internal examination in the same semester, covering the total syllabus of FIVE Units in the respective course.

This Make-up examination will be given a weightage of 80%. Make-up tests shall be conducted outside the working hours and there can be even two such examinations on a day.

Student absent for I Internal examination with valid reasons he/ she should produce a

supporting document to the department within a week after completion of last internal examination. And the same student absent for same subject in II Internal examination, he/ she should produce a supporting document to the department immediately in order to giving the provision for makeup examination.

Make-up internal examinations are not for improvement of marks in Theory Internal examinations. There shall be no make-up internal examinations for a Lab course.

8.1.6 Evaluation of Skill oriented / Skill advanced / Soft Skills course

Course type: Laboratory

Distribution of marks: 40:60

Evaluation Type: Internal Evaluation

A student is evaluated for a maximum of 100 marks with respect to skill-oriented course / Skill advanced courses / Soft skill course. The distribution of marks shall be 40 for internal evaluation and 60 for external evaluation. For Internal Evaluation, day-to-day performance of the student in the laboratory shall be evaluated for 40 marks by the concerned skill-oriented course / Skill advanced courses / Soft skill course class teacher based on experimental evaluation / discussions / results / reports. External evaluation is done for 60 marks in a laboratory end semester examination conducted for 3 hours.

Note: Each skill-oriented course / Skill advanced courses / Soft skill course will have its own evaluation procedure and weightage. The respective department prepare and provide the evaluation format to the student in the beginning of the semester.

8.2 End Evaluation

8.2.1 Theory End Evaluation

As specified in 8.0, Theory End Evaluation is done for 60 marks. Semester End examination of theory subjects shall be conducted at the end of semester. There shall be Regular and Supplementary End Examinations. Theory Semester End Examination shall be conducted for 60 marks and is of 3 hours duration.

Theory Semester End Examination shall have Part A & Part B. In Part A, which is compulsory, five short answer questions each unit of which carries two marks shall be given. There shall be no sub-questions or bits or fill-up the blanks.

Part B shall contain five either or type questions (Total 10 questions with internal choice). 50 marks allotted for Part B and each question shall carry 10 marks. There will be one question from each unit. The examination shall be conducted for 3 hours.

Question paper pattern for Semester End Examination (60 Marks) shall be as follows:

PART A: 5 x 2 = 10 Marks

(i) There shall be one question from each unit.

(ii) Part A is compulsory.

PART B: 5 x 10 = 50 Marks

(i) Five questions with internal choice will be given.
(ii) There shall be one question from each unit with Internal Choice i.e., 'either' or 'choice.'
(iii) Sub questions may also be given.

8.2.2 Lab End Evaluation

As specified in 8.0, Lab End Evaluation is done for 60 marks, in the form a Lab End Examination that shall be conducted for 3 hours in respective Laboratory. Each lab course will have its own evaluation procedure and weightage.

8.2.3 Supplementary Theory / Lab End Examinations

- Supplementary examination shall be conducted along with regular semester end examinations.
- During Semester End Examinations of even semester, supplementary examinations of odd semester shall be conducted and during semester end examinations of odd semester, supplementary examinations of even semester shall be conducted.
- The same schedule is applicable to Supplementary Lab End Examinations. Supplementary examination shall be conducted along with the next batch of students or separately.
- Advanced supplementary shall be conducted only for Final Year II semester Students in view of their higher education pursuits and placement opportunities.
- In case of seminars and comprehensive viva-voce examinations, supplementary seminar / comprehensive viva-voce will be conducted along with the next batch of students. If the next batch of students is not available, a separate supplementary examination will be conducted.

8.2.4 Challenge Evaluation, Revaluation and Recounting

Students may visit Examination Section Webpage for Norms and Procedures for Challenge Evaluation, Revaluation and Recounting of Answer Scripts. (Refer to Appendix II).

9.0 Internship and Project Evaluation

9.1 Summer Internship / Research Internship (Industry / Govt. / NGO / MSME / Online)

- A student shall carry out a mandatory Internship for 2 months for 2 credits in 2nd year 2nd semester during summer vacation and it is evaluated during 3rd year 1st semester. A student shall carry a mandatory Industrial / Research Internship for 2 months for 2 credits in 3rd year 2nd semester during summer vacation and it is evaluated during 4th year 1st semester.
- Two summer internships, each with a minimum of 6 weeks duration. Done at the end of 2nd and 3rd year, respectively are mandatory. The internship can be done by the students at local industries, Govt. Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs.
- Evaluation of the summer internships shall be through the departmental committee. A student will be required to submit a summer internship report to the concerned departments and appear for an oral presentation before the departmental committee. The report and the oral presentation shall carry 40% and 60% weightages respectively.
- In the final semester, the student should mandatorily undergo internships and parallel he/she should work on a project with well-defined objectives. At the end of the semester the candidates shall submit an internship completion certificate and a project report. A student shall also be permitted to submit a project report on the work carried out during the internship. The project report shall be evaluated by an external examiner.
- The respective departments shall facilitate and monitor the student internship programs. Completion of internships is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.
- There shall also be mandatory full internship in the final semester of the programme along with the project work.
- For other details, please refer to Appendix I.

9.2 Project Work

Project work consists of a presentation of **Abstract of the main project** in the beginning of 8th Semester. After selecting specific topic, the student shall collect the information and prepare a report, showing his/her understanding of the topic and submit the same to the department before presentation. Project shall be evaluated for a total of 200 marks. The technical presentation/report shall be evaluated by a committee consisting of Head of the Department along with two senior faculty members of the Department. A student shall acquire 12 credits assigned, if her/his report is declared Satisfactory by the committee based on Rubrics set by the Department for evaluation.

Out of a total of 200 marks for the **Project work,** the internal evaluation shall be carried for 50 marks done by a committee consisting of Dean / HOD, Project Supervisor and senior faculty member of the department and the remaining 150 marks shall be awarded by a committee consisting of Dean / HOD, project Supervisor and an External Examiner nominated by the Vice Chancellor or Dean Academics. The internal evaluation shall be done on the basis of two seminars conducted in a semester as per the academic calendar and stipulated rubrics. In case, if a student fails in Project work, a re-examination shall be conducted within a month. In case he/she fails in the re-examination also, he/she shall not be permitted register for viva voce examination. Further such students shall re-appear as and when next year 8th semester supplementary examinations are conducted.

10. Credit Transfer Policy

Adoption of MOOCs is mandatory, to enable Blended model of teaching-learning as also envisaged in the NEP 2020. As per University Grants Commission (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2016, the University shall allow up to a maximum of 20% of the total courses being offered in a particular programme i.e., maximum of 32 credits through MOOCs platform.

i) The University shall offer credit mobility for MOOCs and give the equivalent credit weightage to the students for the credits earned through online learning courses.

ii) Student registration for the MOOCs shall be only through the respective departments of the university, it is mandatory for the student to share necessary information with the department.

iii) The credit transfer policy will be applicable to the Professional & Open Elective courses only.

iv) The department concerned shall identify the courses permitted for credit transfer.

v) The respective department shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer.

vi) The respective department shall designate a faculty member as a Mentor for each course to guide the students from registration till completion of the credit course.

vii) The University shall ensure no overlap of MOOC exams with that of the University examination schedule. In case of delay in results, the University will re-issue the marks sheet for such students.

viii) Students pursuing courses under MOOCs shall acquire the required credits only after successful completion of the course and submitting a certificate issued by the competent authority along with the percentage of marks and grades.

ix) The respective department shall submit the following to the examination section of the University:

a) List of students who have passed MOOC courses in the current semester along with the certificate of completion.

b) Undertaking form filled in by the students for credit transfer.

x) The university shall resolve any issues that may arise in the implementation of this policy from time to time and shall review its credit transfer policy in the light of periodic changes brought by UGC, SWAYAM, NPTEL and state government.

Note: Students shall be permitted to register for MOOCs courses offered through online platforms approved by the University from time to time.

11. Academic Bank of Credits (ABC)

The University has implemented Academic Bank of Credits (ABC) to promote flexibility in curriculum as per NEP 2020 to

i) Provide option of mobility for learners across the universities of their choice

ii) Provide options to gain credits through MOOCs from approved digital platforms.

iii) Facilitate award of certificate/diploma/degree in line with the accumulated credits in ABC

iv) Execute Multiple Entry and Exit system with credit count, credit transfer and credit acceptance from students' account.

12. Curricular Framework for Honors Programme

- Students of a Department/ Discipline are eligible to opt for Honors Programme offered by the same Department/Discipline
- 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 7.5 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 7.5 SGPA, his/her registration for Honors Programme stands cancelled and he/she shall continue with the regular Programme.
- 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 the same branch under this scheme, he/ she will be awarded B. Tech (honors) in Mechanical Engineering.
- In addition to fulfilling all the requisites of a Regular B. Tech Programme, 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 Undergraduate Degree in Major Discipline (i.e. 160 credits).
- 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 8/12 weeks as recommended by the Board of studies.
- 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.

- 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.
- Each pool can have theory as well as laboratory courses. If a course comes with a lab component, that component must be cleared separately. The concerned BoS shall explore the possibility of introducing virtual labs for such courses with lab components. (Model pool list is enclosed at the end of the syllabus)
- 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 Academies Council.
- The concerned BoS shall also consider courses listed under professional electives of the respective B. Tech Programmes for the requirement 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 Programme.
- If a student drops or is terminated from the Honors programme, the additional credits so far earned cannot be converted into free or core electives; they will remain extra. These additional courses will find mentioned 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.
- In case 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.

- Honors must be completed simultaneously with a major degree Programme. A student cannot earn Honors after he/she has already earned bachelor's degree.

13. Curricular Framework for Minor Programme

- Students who are desirous of pursuing their special interest areas other than the choses 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 select 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.
- 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, and VLSI etc.,
- The list of disciplines / branches eligible to opt for a particular industry relevant minor specialization shall be clearly mentioned by the respective BoS.
- There shall be no limit on the number of programs offered under Minor. The university 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 Programme.
- 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.
- A student shall be permitted to register for Minors Programme at the beginning of 4^{th} semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 7.5 SGPA up to the end of 2^{nd} semester without any history of backlogs. It is expected that the 3^{rd} semester results may be announced after the commencement of the 4^{th} semester. If a student fails to acquire 7.5 SGPA up to 3^{rd}

semester or failed in any of the courses, his/her registration for Minors program shall stand cancelled. An SGPA of 7.5 has to be maintained in the subsequent semesters without any backlog in order to keep the Minors registration active.

- A student shall earn an 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 Undergraduate Degree in Major Discipline (i.e. 160 credits).
- Out of the 20 credits, 16 credits shall be earned by undergoing specified course 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 Programme.
- 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. A 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 Academic Council of the university.
- Students can opt for the industry relevant minor specialization as approved by the concerned departmental BoS. Students can opt for 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 the latest skills based on industrial demand.
- A committee should be formed at the level of University / 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 committees 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.

- If a student drops (or terminated) from the Minor Programme, they cannot convert the earned credits into free or core electives, they will remain extra. These additional courses will find mentioned 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 Miner will be shown in the transcript.
- 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.
- Minor must be completed simultaneously with a major degree Programme. A student cannot earn the Minor after he/she has already earned bachelor's degree.

14. Attendance Requirements and Detention Policy

- A student shall maintain a minimum required attendance of 40% in each subject and 75% in AGGREGATE of all the subjects in a semester.
- Shortage of attendance up to 10% i.e., attendance between 65% to 75% in aggregate, may be condoned by the University Academic Committee based on the rules prescribed by the Academic Council of the University from time to time.
- A stipulated fee shall be payable towards condonation of shortage of attendance.
- Shortage of attendance below 65 % shall in no case be condoned. A stipulated fee shall be payable towards condonation of shortage of attendance to the University as per following slab system.

  1stSlab: Less than 75 % attendance but equal to or greater than 70 % a normal condonation fee can be collected from the student.

  2ndSlab: Less than 70 % but equal to or greater than 65 %, double the condonation fee can be collected from the student.
- Students whose shortage of attendance is not condoned OR who have not paid the stipulated fee OR who have not cleared any other due to the University in any semester are

not eligible to write the Semester End Examination (SEE).

- Students, who do not meet the minimum required attendance of 65% in a semester, shall be detained in that semester and their registration for that semester shall stand cancelled. They shall not be promoted to the next semester.
- Students detained in a semester shall seek re-admission into that semester as and when offered.
- Academic regulations applicable to the semester in which re-admission is sought shall be applicable to the re-admitted student.
- In case, there are any professional electives and /or open electives, the same may also be re-registered, if offered. However, if those electives are not offered in the later semesters, then alternate electives may be chosen from the same set of elective courses offered under that category.

  Any student against whom any disciplinary action is pending shall not be permitted to attend Semester End examination (SEE) in that semester.

15. Minimum Academic Requirements and Award of the Degree

The following academic requirements must be satisfied in addition to the attendance requirements mentioned in section 14.

i) A student shall be promoted from first year to second year if he/she fulfills the minimum attendance requirement as per university norms.

ii) A student will be promoted from II to III year if he/she fulfills the academic requirement of securing 40% of the credits (any decimal fraction should be rounded off to lower digit) up to in the subjects that have been studied up to III semester.

iii) A student shall be promoted from III year to IV year if he/she fulfills the academic requirements of securing 40% of the credits (any decimal fraction should be rounded off to lower digit**)** in the subjects that have been studied up to V semester. And in case a student is detained for want of credits for a particular academic year by ii) & iii) above, the student may make up the credits through supplementary examinations and only after securing the required credits he/she shall be permitted to join in the V semester or VII semester respectively as the case may be.

iv) When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfillment of academic regulations. In such a case, he/she shall be in the academic regulations into which he/she is readmitted.

v) Students who fail to earn 160 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat on the B.Tech. course and their admission shall be cancelled.

16. Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed:

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

Structure of Grading of Academic Performance

Range in which the marks in the subject fall	**Grade**	**Grade points Assigned**
90 & above	Superior	10
80 - 89	A (Excellent)	9
70 - 79	B (Very Good)	8
60 - 69	C (Good)	7
50 - 59	D (Average)	6
40 - 49	E (Pass)	5
< 40	F (Fail)	0
Absent	Ab (Absent)	0

i) A student obtaining Grade 'F' or Grade 'Ab' in a subject shall be considered failed and will be required to reappear for that subject when it is offered the next supplementary examination.

ii) For non-credit audit courses, "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA/Percentage.

Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade point 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.,

$$SGPA = \frac{\sum(C_i * G_i)}{\sum C_i}$$

Where $\boldsymbol{C_i}$ is the number of credits of the $\boldsymbol{i^{th}}$ subject and $\boldsymbol{G_i}$ is the grade point scored by the student in the $\boldsymbol{i^{th}}$ course

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

$$CGPA = \frac{\sum(C_i * S_i)}{\sum C_i}$$

Where $\boldsymbol{S_i}$ is the SGPA of the $\boldsymbol{i^{th}}$ semester and $\boldsymbol{C_i}$ is the total number of credits up to that semester.

Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts. While computing the SGPA 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 the letters S, A, B, C, D and F.

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/she shall be placed in one of the following four classes:

Class Awarded	**CGPA Secured**
First Class with Distinction	≥7.5
First Class	≥6.5 <7.5
Second Class	≥5.5 <6.5
Pass Class	≥5.0 <5.5

16.1 Conversion of SGPA into percentage

In case of a specific query by students/employers regarding Semester Grade Point Average (SGPA)/ Cumulative Grade Point Average (CGPA) into percentage, the following formulae will be adopted for notional conversion of CGPA into percentage.

CGPA to Percentage conversion Formula – (CGPA – 0.5) x 10.

17. Transcripts

After successful completion of the entire programme of study, a transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued, if required, after payment of requisite fee. Partial transcript will also be issued up to any point of study to a student on request.

18. Transitory Regulations

Discontinued, detained, or failed candidates are eligible for re-admission as and when the semester is offered after fulfilment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section 2 and they will follow the academic regulations into which they are re-admitted.

Candidates who are permitted to avail gap year shall be eligible for re-joining into the succeeding year of their B. Tech from the date of commencement of class work, subject to Section 2 and they will follow the academic regulations into which they are re-admitted.

19. Re-admission of Students

A student who has satisfied the minimum attendance requirement in any semester may repeat that semester, after obtaining written permission from the Registrar and cancelling the previous record of attendance and academic performance (viz; internal evaluation and external evaluation marks) of the semester or year. This facility may be availed by any student at the maximum twice for a 4-year B. Tech, and only once by Lateral Entry student during the entire course of study.

20. Minimum Instruction Days for a Semester

The minimum instruction days for each semester shall be 16 weeks.

21. Student transfers

Student transfers shall be as per the statutes and ordinances of the Annamacharya University and guidelines issued by the Government of Andhra Pradesh from time to time.

22. Announcement of results

- Results review committee comprising of Vice Chancellor, Registrar, Dean Academics, Chairman of various boards of studies, Controller of Examinations and Deputy Controller of Examinations will monitor the results and gives the permission for announcement of results.
- After review meeting results are loaded into university website from which students can access their results by entering Hall Ticket number. And also results in form of hard copy are available with respective Deans / Heads of the departments.

23. General Instructions:

- The academic regulations should be read as a whole for purpose of any interpretation.
- Malpractices rules-nature and punishments are appended.
- Where the words "he", "him", "his", occur in the regulations, they also include "she", "her", "hers", respectively.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice Chancellor / Registrar / Governing body is final.
- Any legal issues are to be resolved in Rajampet Jurisdiction.
- The University may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the University.

Appendix-I: Internship Guidelines

The Dean / Head of the Department will arrange internship for students in industries / organization after fifth semester as per AICTE/ University guidelines. The university may also device online system for arranging & managing internships. The general procedure for arranging internship is given below:

Step 1: Request Letter/ Email from the office of HOD of the department should go to industry to allot various slots of 4-6 weeks during summer vacation as internship periods for the students. Students request letter/profile/ interest areas may be submitted to industries for their willingness for providing the training.

Step 2: Industry will confirm the training slots, and the number of seats allocated for internships via Confirmation Letter/ Email. In case the students arrange the training themselves the confirmation letter will be submitted by the students in the office of Training & Placement through concerned department. Based on the number of slots agreed to by the industry.

Step 3: Students on joining Training at the concerned Industry / Organization, submit the Joining Report/ Letters / Email.

Step 4: Students undergo industrial training at the concerned Industry / Organization. In-between Faculty Member(s) evaluate(s) the performance of students once/twice by visiting the Industry/Organization and Evaluation Report of the students is submitted in department office/TPO with the consent of Industry persons/ Trainers.

Step 5: Students will submit training report after completion of internship.

Step 6: Training Certificate to be obtained from industry.

Step 7: List of students who have completed their internship successfully will be issued by concerned Department.

For more details refer:

https://www.aicte-india.org/sites/default/files/AICTE%20Internship%20Policy.pdf

Appendix II: Norms and Procedures for Challenge Evaluation/Revaluation/Recounting

Revaluation / Recounting:

- The students who wish to apply for Revaluation/Recounting of his/her answer-books(s) must submit his/her application on the prescribed from together with the requisite fee to the Controller of Examinations before expiry of 15 days excluding the date of the declaration of his/her examination result. Application not received in the prescribed form or by the due date or without the requisite fee shall be rejected.
- After Recounting / Revaluation, records are updated with changes if any and the student will be issued a revised memorandum of marks. If there are no changes, the student shall be intimated the same through a notice.
- No Revaluation / Recounting for Laboratory Examination.
- The students are informed to be more careful in furnishing the information while applying for Recounting / Revaluation. The applications with insufficient information will be summarily rejected and the student has to forfeit the amount paid in this connection.

Challenge valuation:

- Applications are invited from the students who wish to apply for Challenge Valuation in the subjects of the B. Tech Regular and Supplementary examinations.
- The student will apply for Challenge valuation in a specified application and should be routed through the HOD concerned.
- The students who have applied for the revaluation for a paper(s) of an examination are only eligible for the Challenge Valuation of that paper(s) of that examination.
- A Fee of Rs. 10000/- (Ten Thousand Rupees Only) for each paper is to be paid within the last date for challenge valuation.
- A Xerox copy of the answer script will be provided to the student on receipt of the payment of fee and date and time of the valuation will be informed to the student, so that valuation will be done in the presence of the teacher attended in support of the student nominated by the HOD concerned.
- The HOD concerned will nominate a teacher of the concerned subject to observe the valuation in support of the student. This will be done at the request of the student.
- If the marks obtained in the challenge valuation are more than or equal to 15% of the maximum marks with respect to the original marks obtained in the first valuation, then the marks obtained in the Challenge valuation will be awarded to the student and the University will pay back Rs 9,000 (Nine thousand rupees only) to the student. If the student status changes from fail to pass, an amount of Rs. 5000 will be refunded to the student. Otherwise, there will not be any change in the result of the student and original marks will be retained and the student will forfeit the fee paid.
- No Challenge valuation for Laboratory Examination

APPENDIX III: Rules for Disciplinary Action for Malpractices / Improper Conduct in Examinations

Malpractices identified by squad or special invigilators or invigilators.

Punishments shall be given to the students as per the above guidelines. The case is to be referred to the malpractice committee.

Malpractice committee

1. The Vice Chancellor, Chairman
2. Registrar, Member
3. Dean, Academics, Member
4. Invigilator, Member
5. Subject expert, Member
6. Concerned Dean / Head of the Department, Member
7. Controller of Examinations, Member Secretary

Note:

Whenever the performance of a student is cancelled in any subject/subjects due to Malpractice, he has to register for End Examinations in that subject/subjects consequently and has to fill all the norms required for the award of Degree.

	Nature of Malpractices/Improper conduct	Punishment
	If the candidate:	
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
1(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred for four 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. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for four consecutive semesters from class work and all University examinations, if his involvement is established. Otherwise, the candidate is debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject only.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant — Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in	In case of student of the University, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. If the candidate physically assaults the invigilator/officer-in-charge of the Examinations, then the candidate is also debarred and forfeits his/her seat. In case of outsiders, they will be handed over to the police and a police case is registered against them.

	damage to or destruction of property in the examination hall or any part of the University 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.	
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If students of the university, who is not a candidate for the particular examination or any person not connected with the University indulges in nay malpractice or improper conduct mentioned in class 6 to 8.	Student of the university expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person (s) who does not belong to the University will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject only or in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester / year examinations, depending on the recommendation of the committee.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 12 shall be reported to the University for further action to award suitable punishment.	

AU24 REGULATIONS COURSE STRUCTURE

DEPARTMENT OF CIVIL ENGINEERING

Semester I (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24AEEE11T	Basic Electrical and Electronics Engineering	3	0	0	3
2	BS	24ACHE11T	Engineering Chemistry	3	0	0	3
3	BS	24AMAT11T	Matrix Theory and Calculus	3	0	0	3
4	ESC	24ACSE11T	Computational Problem Solving	3	0	0	3
5	ESC	24AMEC11T	Engineering Drawing	1	0	4	3
6	BS (LAB)	24AEEE11L	Basic Electrical and Electronics Engineering Lab	0	0	2	1
7	BS (LAB)	24ACHE11L	Engineering Chemistry Lab	0	0	2	1
8	ESC (LAB)	24ACSE11L	Computational Problem-Solving Lab	0	0	2	1
9	HSM	24ALAN11T	Foreign Language Elective	1	0	0	1
						Total Credits	**19**

Semester II (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24APHY21T	Engineering Physics	3	0	0	3
2	BS	24AMAT22T	Differential Equations and Transform Techniques	3	0	0	3
3	HSM	24AENG21T	English for Engineers	3	0	0	3
4	ESC	24ACIV21T	Engineering Mechanics	3	0	3	3
5	ESC	24ACIV22T	Computer Applications for Civil Engineering	3	0	0	3
6	ESC	24AMEC22L	Engineering & IT Workshop	1	0	4	3
7	BS (LAB)	24APHY21L	Engineering Physics Lab	0	0	2	1
8	HSM (LAB)	24AENG21L	English Language Communication Skills Lab	0	0	2	1
9	ESC (LAB)	24ACIV21L	Engineering Mechanics Lab	0	0	2	1
						Total Credits	**21**

AU24 REGULATIONS COURSE STRUCTURE

DEPARTMENT OF MECHANICAL ENGINEERING

Semester I (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24AEEE11T	Basic Electrical and Electronics Engineering	3	0	0	3
2	BS	24ACHE11T	Engineering Chemistry	3	0	0	3
3	BS	24AMAT11T	Matrix Theory and Calculus	3	0	0	3
4	ESC	24ACSE11T	Computational Problem Solving	3	0	0	3
5	ESC	24AMEC11T	Engineering Drawing	1	0	4	3
6	BS (LAB)	24AEEE11L	Basic Electrical and Electronics Engineering Lab	0	0	2	1
7	BS (LAB)	24ACHE11L	Engineering Chemistry Lab	0	0	2	1
8	ESC (LAB)	24ACSE11L	Computational Problem-Solving Lab	0	0	2	1
9	HSM	24ALAN11T	Foreign Language Elective	1	0	0	1
						Total Credits	**19**

Semester II (First Year)

Sl. No.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24APHY21T	Engineering Physics	3	0	0	3
2	BS	24AMAT22T	Differential Equations and Transform Techniques	3	0	0	3
3	HSM	24AENG21T	English for Engineers	3	0	0	3
4	ESC	24ACIV21T	Engineering Mechanics	3	0	3	3
5	ESC	24ACSE23T	The Joy of Computing using Python	3	0	0	3
6	ESC	24AMEC22L	Engineering & IT Workshop	1	0	4	3
7	BS (LAB)	24APHY21L	Engineering Physics Lab	0	0	2	1
8	HSM (LAB)	24AENG21L	English Language Communication Skills Lab	0	0	2	1
9	ESC (LAB)	24ACIV21L	Engineering Mechanics Lab	0	0	2	1
						Total Credits	**21**

AU24 REGULATIONS COURSE STRUCTURE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Semester I (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24AEEE11T	Basic Electrical and Electronics Engineering	3	0	0	3
2	BS	24ACHE12T	Chemistry	3	0	0	3
3	BS	24AMAT11T	Matrix Theory and Calculus	3	0	0	3
4	ESC	24ACSE11T	Computational Problem Solving	3	0	0	3
5	ESC	24AMEC11T	Engineering Drawing	1	0	4	3
6	BS (LAB)	24AEEE11L	Basic Electrical and Electronics Engineering Lab	0	0	2	1
7	BS (LAB)	24ACHE12L	Chemistry Lab	0	0	2	1
8	ESC (LAB)	24ACSE11L	Computational Problem-Solving Lab	0	0	2	1
9	HSM	24ALAN11T	Foreign Language Elective	1	0	0	1
						Total Credits	**19**

Semester II (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24APHY22T	Applied Physics	3	0	0	3
2	BS	24AMAT22T	Differential Equations and Transform Techniques	3	0	0	3
3	HSM	24AENG21T	English for Engineers	3	0	0	3
4	ESC	24AECE21T	Fundamentals of Electronic Devices and Circuits	3	0	3	3
5	ESC	24AEEE22T	Electrical Circuits-1	3	0	0	3
6	ESC	24AMEC22L	Engineering & IT Workshop	1	0	4	3
7	BS (LAB)	24APHY22L	Applied Physics Lab	0	0	2	1
8	HSM (LAB)	24AENG21L	English Language Communication Skills Lab	0	0	2	1
9	ESC (LAB)	24AECE21L	Fundamentals of Electronic Devices and Circuits lab	0	0	2	1
						Total Credits	**21**

AU24 REGULATIONS COURSE STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Semester I (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24AEEE11T	Basic Electrical and Electronics Engineering	3	0	0	3
2	BS	24ACHE12T	Chemistry	3	0	0	3
3	BS	24AMAT11T	Matrix Theory and Calculus	3	0	0	3
4	ESC	24ACSE11T	Computational Problem Solving	3	0	0	3
5	ESC	24AMEC11T	Engineering Drawing	1	0	4	3
6	BS (LAB)	24AEEE11L	Basic Electrical and Electronics Engineering Lab	0	0	2	1
7	BS (LAB)	24ACHE12L	Chemistry Lab	0	0	2	1
8	ESC (LAB)	24ACSE11L	Computational Problem-Solving Lab	0	0	2	1
9	HSM	24ALAN11T	Foreign Language Elective	1	0	0	1
						Total Credits	**19**

Semester II (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24APHY22T	Applied Physics	3	0	0	3
2	BS	24AMAT22T	Differential Equations and Transform Techniques	3	0	0	3
3	HSM	24AENG21T	English for Engineers	3	0	0	3
4	ESC	24AECE22T	Electronic Devices & Circuits	3	0	3	3
5	ESC	24AEEE23T	Network Analysis	3	0	0	3
6	ESC	24AMEC22L	Engineering & IT Workshop	1	0	4	3
7	BS (LAB)	24APHY22L	Applied Physics Lab	0	0	2	1
8	HSM (LAB)	24AENG21L	English Language Communication Skills Lab	0	0	2	1
9	ESC (LAB)	24AECE22L	Electronic Devices & Circuits Lab	0	0	2	1
						Total Credits	**21**

AU24 REGULATIONS COURSE STRUCTURE

DEPARTMENT OF COMUPUTER SCIENCE ENGINEERING

Semester I (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	HSM	24AENG11T	English for Engineers	3	0	0	3
2	BS	24APHY12T	Applied Physics	3	0	0	3
3	BS	24AMAT11T	Matrix Theory and Calculus	3	0	0	3
4	ESC	24ACSE11T	Computational Problem Solving	3	0	0	3
5	ESC	24AMEC12L	Engineering & IT Workshop	1	0	4	3
6	HSM (LAB)	24AENG11L	English Language Communication Skills Lab	0	0	2	1
7	BS (LAB)	24APHY12L	Applied Physics Lab	0	0	2	1
8	ESC (LAB)	24ACSE11L	Computational Problem-Solving Lab	0	0	2	1
9	HSM	24ALAN11T	Foreign Language Elective	1	0	0	1
						Total Credits	**19**

Semester II (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24ACHE22T	Chemistry	3	0	0	3
2	BS	24AMAT22T	Differential Equations and Transform Techniques	3	0	0	3
3	BS	24AEEE21T	Basic Electrical and Electronics Engineering	3	0	0	3
4	ESC	24ACSE22T	Data Structures	3	0	3	3
5	ESC	24ACSE23T	The Joy of Computing using Python	3	0	0	3
6	ESC	24AMEC21T	Engineering Drawing	1	0	4	3
7	BS (LAB)	24ACHE22L	Chemistry Lab	0	0	2	1
8	BS (LAB)	24AEEE21L	Basic Electrical and Electronics Engineering Lab	0	0	2	1
9	ESC (LAB)	24ACSE22L	Data Structures Lab	0	0	2	1
						Total Credits	**21**

AU24 REGULATIONS COURSE STRUCTURE

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Semester I (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24AEEE11T	Basic Electrical and Electronics Engineering	3	0	0	3
2	BS	24ACHE12T	Chemistry	3	0	0	3
3	BS	24AMAT11T	Matrix Theory and Calculus	3	0	0	3
4	ESC	24ACSE11T	Computational Problem Solving	3	0	0	3
5	ESC	24AMEC11T	Engineering Drawing	1	0	4	3
6	BS (LAB)	24AEEE11L	Basic Electrical and Electronics Engineering Lab	0	0	2	1
7	BS (LAB)	24ACHE12L	Chemistry Lab	0	0	2	1
8	ESC (LAB)	24ACSE11L	Computational Problem-Solving Lab	0	0	2	1
9	HSM	24ALAN11T	Foreign Language Elective	1	0	0	1
						Total Credits	**19**

Semester II (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24APHY22T	Applied Physics	3	0	0	3
2	BS	24AMAT22T	Differential Equations and Transform Techniques	3	0	0	3
3	HSM	24AENG21T	English for Engineers	3	0	0	3
4	ESC	24ACSE22T	Data Structures	3	0	3	3
5	ESC	24ACSE23T	The Joy of Computing using Python	3	0	0	3
6	ESC	24AMEC22L	Engineering & IT Workshop	1	0	4	3
7	BS (LAB)	24APHY22L	Applied Physics Lab	0	0	2	1
8	HSM (LAB)	24AENG21L	English Language Communication Skills Lab	0	0	2	1
9	ESC (LAB)	24ACSE22L	Data Structures Lab	0	0	2	1
						Total Credits	**21**

AU24 REGULATIONS COURSE STRUCTURE

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Semester I (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	HSM	24AENG11T	English for Engineers	3	0	0	3
2	BS	24APHY12T	Applied Physics	3	0	0	3
3	BS	24AMAT11T	Matrix Theory and Calculus	3	0	0	3
4	ESC	24ACSE11T	Computational Problem Solving	3	0	0	3
5	ESC	24AMEC12L	Engineering & IT Workshop	1	0	4	3
6	HSM (LAB)	24AENG11L	English Language Communication Skills Lab	0	0	2	1
7	BS (LAB)	24APHY12L	Applied Physics Lab	0	0	2	1
8	ESC (LAB)	24ACSE11L	Computational Problem-Solving Lab	0	0	2	1
9	HSM	24ALAN11T	Foreign Language Elective	1	0	0	1
						Total Credits	**19**

Semester II (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24ACHE22T	Chemistry	3	0	0	3
2	BS	24AMAT22T	Differential Equations and Transform Techniques	3	0	0	3
3	BS	24AEEE21T	Basic Electrical and Electronics Engineering	3	0	0	3
4	ESC	24ACSE22T	Data Structures	3	0	3	3
5	ESC	24ACSE23T	The Joy of Computing using Python	3	0	0	3
6	ESC	24AMEC21T	Engineering Drawing	1	0	4	3
7	BS (LAB)	24ACHE22L	Chemistry Lab	0	0	2	1
8	BS (LAB)	24AEEE21L	Basic Electrical and Electronics Engineering Lab	0	0	2	1
9	ESC (LAB)	24ACSE22L	Data Structures Lab	0	0	2	1
						Total Credits	**21**

AU24 REGULATIONS COURSE STRUCTURE

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

(Internet of Things and Cyber Security including Block Chain Technology)

Semester I (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24AEEE11T	Basic Electrical and Electronics Engineering	3	0	0	3
2	BS	24ACHE12T	Chemistry	3	0	0	3
3	BS	24AMAT11T	Matrix Theory and Calculus	3	0	0	3
4	ESC	24ACSE11T	Computational Problem Solving	3	0	0	3
5	ESC	24AMEC11T	Engineering Drawing	1	0	4	3
6	BS (LAB)	24AEEE11L	Basic Electrical and Electronics Engineering Lab	0	0	2	1
7	BS (LAB)	24ACHE12L	Chemistry Lab	0	0	2	1
8	ESC (LAB)	24ACSE11L	Computational Problem-Solving Lab	0	0	2	1
9	HSM	24ALAN11T	Foreign Language Elective	1	0	0	1
						Total Credits	**19**

Semester II (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24APHY22T	Applied Physics	3	0	0	3
2	BS	24AMAT22T	Differential Equations and Transform Techniques	3	0	0	3
3	HSMC	24AENG21T	English for Engineers	3	0	0	3
4	ESC	24ACSE22T	Data Structures	3	0	3	3
5	ESC	24ACSE23T	The Joy of Computing using Python	3	0	0	3
6	ESC	24AMEC22L	Engineering & IT Workshop	1	0	4	3
7	BS (LAB)	24APHY22L	Applied Physics Lab	0	0	2	1
8	HSM (LAB)	24AENG21L	English Language Communication Skills Lab	0	0	2	1
9	ESC (LAB)	24ACSE22L	Data Structures Lab	0	0	2	1
						Total Credits	**21**

AU24 REGULATIONS COURSE STRUCTURE

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

(Artificial Intelligence)

Semester I (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24AEEE11T	Basic Electrical and Electronics Engineering	3	0	0	3
2	BS	24ACHE12T	Chemistry	3	0	0	3
3	BS	24AMAT11T	Matrix Theory and Calculus	3	0	0	3
4	ESC	24ACSE11T	Computational Problem Solving	3	0	0	3
5	ESC	24AMEC11T	Engineering Drawing	1	0	4	3
6	BS (LAB)	24AEEE11L	Basic Electrical and Electronics Engineering Lab	0	0	2	1
7	BS (LAB)	24ACHE12L	Chemistry Lab	0	0	2	1
8	ESC (LAB)	24ACSE11L	Computational Problem-Solving Lab	0	0	2	1
9	HSM	24ALAN11T	Foreign Language Elective	1	0	0	1
						Total Credits	**19**

Semester II (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24APHY22T	Applied Physics	3	0	0	3
2	BS	24AMAT22T	Differential Equations and Transform Techniques	3	0	0	3
3	HSM	24AENG21T	English for Engineers	3	0	0	3
4	ESC	24ACSE22T	Data Structures	3	0	3	3
5	ESC	24ACSE23T	The Joy of Computing using Python	3	0	0	3
6	ESC	24AMEC22L	Engineering & IT Workshop	1	0	4	3
7	BS (LAB)	24APHY22L	Applied Physics Lab	0	0	2	1
8	HSM (LAB)	24AENG21L	English Language Communication Skills Lab	0	0	2	1
9	ESC (LAB)	24ACSE22L	Data Structures Lab	0	0	2	1
						Total Credits	**21**

AU24 REGULATIONS COURSE STRUCTURE

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

(Data Science)

Semester I (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	HSM	24AENG11T	English for Engineers	3	0	0	3
2	BS	24APHY12T	Applied Physics	3	0	0	3
3	BS	24AMAT11T	Matrix Theory and Calculus	3	0	0	3
4	ESC	24ACSE11T	Computational Problem Solving	3	0	0	3
5	ESC	24AMEC12L	Engineering & IT Workshop	1	0	4	3
6	HSM (LAB)	24AENG11L	English Language Communication Skills Lab	0	0	2	1
7	BS (LAB)	24APHY12L	Applied Physics Lab	0	0	2	1
8	ESC (LAB)	24ACSE11L	Computational Problem-Solving Lab	0	0	2	1
9	HSM	24ALAN11T	Foreign Language Elective	1	0	0	1
						Total Credits	**19**

Semester II (First Year)

Sl. No.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24ACHE22T	Chemistry	3	0	0	3
2	BS	24AMAT22T	Differential Equations and Transform Techniques	3	0	0	3
3	BS	24AEEE21T	Basic Electrical and Electronics Engineering	3	0	0	3
4	ESC	24ACSE22T	Data Structures	3	0	3	3
5	ESC	24ACSE23T	The Joy of Computing using Python	3	0	0	3
6	ESC	24AMEC21T	Engineering Drawing	1	0	4	3
7	BS (LAB)	24ACHE22L	Chemistry Lab	0	0	2	1
8	BS (LAB)	24AEEE21L	Basic Electrical and Electronics Engineering Lab	0	0	2	1
9	ESC (LAB)	24ACSE22L	Data Structures Lab	0	0	2	1
						Total Credits	**21**

AU24 REGULATIONS COURSE STRUCTURE

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

(Artificial Intelligence and Machine Learning)

Semester I (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	HSM	24AENG11T	English for Engineers	3	0	0	3
2	BS	24APHY12T	Applied Physics	3	0	0	3
3	BS	24AMAT11T	Matrix Theory and Calculus	3	0	0	3
4	ESC	24ACSE11T	Computational Problem Solving	3	0	0	3
5	ESC	24AMEC12L	Engineering & IT Workshop	1	0	4	3
6	HSM (LAB)	24AENG11L	English Language Communication Skills Lab	0	0	2	1
7	BS (LAB)	24APHY12L	Applied Physics Lab	0	0	2	1
8	ESC (LAB)	24ACSE11L	Computational Problem-Solving Lab	0	0	2	1
9	HSM	24ALAN11T	Foreign Language Elective	1	0	0	1
						Total Credits	**19**

Semester II (First Year)

SNo.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24ACHE22T	Chemistry	3	0	0	3
2	BS	24AMAT22T	Differential Equations and Transform Techniques	3	0	0	3
3	BS	24AEEE21T	Basic Electrical and Electronics Engineering	3	0	0	3
4	ESC	24ACSE22T	Data Structures	3	0	3	3
5	ESC	24ACSE23T	The Joy of Computing using Python	3	0	0	3
6	ESC	24AMEC21T	Engineering Drawing	1	0	4	3
7	BS (LAB)	24ACHE22L	Chemistry Lab	0	0	2	1
8	BS (LAB)	24AEEE21L	Basic Electrical and Electronics Engineering Lab	0	0	2	1
9	ESC (LAB)	24ACSE22L	Data Structures Lab	0	0	2	1
						Total Credits	**21**

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Basic Electrical and Electronics Engineering	
Category:	BS	
Semester:	I Semester	II Semester
Couse Code:	24AEEE11T	24AEEE21T
Branch/es:	CE, ME, EEE, ECE, CSE-AI, AI&DS & CSE-ICB	CSE, CSE-DS, CSE-AIML & AIML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the fundamental laws and circuit elements.
2. To analyze the working of various Machines.
3. To Summarize the different Energy Resources, various Measuring Instruments and importance of Safety Measures.
4. To Describe the various Electronic Devices.
5. To Illustrate the concepts of Bipolar Junction transistor and Diode Applications.

Course Outcomes:

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

1. Understand the fundamental laws and circuit elements.
2. Analyze the Working of DC and AC Machines.
3. Summarize the different Energy Resources, various Measuring Instruments and importance of Safety Measures
4. Analyze basic Semiconductor devices
5. Illustrate the concepts of Bipolar Junction transistor and Diode Applications.

Unit 1 Fundamental Laws and Electrical Circuits 9

Basic definitions - Voltage, current, power, energy, charge, flux, static and dynamic emf, Faraday's laws of electromagnetic induction, Fleming's right hand rule, Fleming's left hand rule, Lenz's law, Cork screw rule, Right hand thumb rule, Right hand palm rule. Types of elements, Types of sources, ohms law, resistive, inductive, capacitive networks, Series-parallel circuits and Kirchhoff's laws- (Basic Numerical Problems).

Unit 2 DC and AC Machines 9

DC Generator: Constructional Details of DC machine, Principle of operation, emf equation, types of generators, applications. (Basic Numerical Problems on EMF equation)

DC Motor: principle of operation, torque equation, types, losses and efficiency, applications, Brake test, Speed control methods. (Basic Numerical Problems).

AC machines: 1-Φ Transformer: Principle of operation, emf equation, losses, efficiency and regulation calculations using OC and SC tests-Three Phase Induction Motor construction and working principle.

Unit 3 Energy Resources, Measuring Instruments & Safety Measures 9

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of Hydel, Solar & Wind power generation.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments, Multi-meter, CRO, DSO and Function generator

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Unit 4 Semiconductor Devices 9

Energy Band Diagram of Semiconductors (Intrinsic & Extrinsic), PN Diode, V-I Characteristics of PN Junction Diode, Applications of diode- Breakdown Mechanisms in semiconductor diodes, Zener diode characteristics and Zener diode acts as a regulator.

Unit 5 Diode Applications and Introduction to Transistors 9

Half Wave and Full Wave Rectifiers – General Filter Considerations – Capacitor Filter. Transistor constructions – Types, Transistor operation in CB, CE and CC configurations and their Characteristics.

Prescribed Textbooks:

1. A.Sudhakar and Shyammohan S Palli, "Circuits and Networks" McGraw Hill, 2018.
2. A.Chakrabarti,"Circuit Theory-Analysis and Synthesis",Dhanpat Rai &Co,2010.
3. S.Salivahanan, N,Suresh Kumar, "Electronic Devices and Circuits" McGraw Hill, 2011

Reference Books:

1. D.P.Kothari and I.J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. D.C.Kulshreshta, "Basic Electrical Engineering", McGraw Hill, 2009.
3. P.S.Dhogal, "Basic Electrical Engineering with Numerical Problems" McGraw Hill
4. C.L Wadhwa, "Electric Power Generation, Distribution and Utilization", New Age Inter. (P) Ltd., 2005.
5. G.D. Rai, "Non- Conventional Energy Sources", Khanna Publishers, 2000.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24AEEE11T/21T.1	2	2	1	1	-	-	-	-	-	-	-	1
24AEEE11T/21T.2	3	3	2	2	-	-	-	-	-	-	-	1
24AEEE11T/21T.3	2	2	1	1	-	-	-	-	-	-	-	1
24AEEE11T/21T.4	3	3	2	2	-	-	-	-	-	-	-	1
24AEEE11T/21T.5	3	2	1	1	-	-	-	-	-	-	-	1

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	English for Engineers	
Category:	HSM	
Semester:	I Semester	II Semester
Couse Code:	24AENG11T	24AENG21T
Branch/es:	CSE, CSE-DS, CSE-AIML & AIML	CE, ME, EEE, ECE, CSE-AI, AI&DS & CSE-ICB

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. to facilitate effective Listening, Reading, Speaking and Writing skills among the students
2. to enhance students' comprehending abilities
3. to provide knowledge of grammatical structures and vocabulary
4. to help students acquire effective speaking and writing skills

Course Outcomes:

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

1. understand the context, topic, and pieces of specific information from social or transactional details
2. analyze literary forms, journalistic articles and scientific readings for comprehension and retention
3. demonstrate effective writing and speaking skills
4. apply grammatical knowledge in speaking and writing and formulate sentences with grammatical accuracy
5. produce coherent and unified paragraphs with adequate support and detail

Unit 1

Lesson: A Proposal to Girdle the Earth
Reading: Skimming the text to get main ideas of it; scanning the text to look for specific pieces of information.
Writing: Mechanics of Writing - Capitalization, Spellings, Punctuation
Grammar: Parts of Speech, Content and Structure words, Basic Sentence Structures, Forming Questions
Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words

Unit 2

Lesson: The District School As It Was by One Who Went to It
Reading: Identifying the sequence of ideas; recognizing verbal techniques that help to link ideas in a paragraph together
Writing: Paragraph writing: Structure of a Paragraph, Cohesive devices - linkers
Grammar: Use of Articles and Zero Article; Prepositions
Vocabulary: Homonyms, Homophones, Homographs

Unit 3

Lesson: The Future of Work
Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension
Writing: Summarizing, Note-making, paraphrasing
Grammar: Verbs - Tenses; Subject-verb Agreement
Vocabulary: Compound words, Collocations

Unit 4

Lesson: H. G. Wells and the Uncertainties of Progress

Reading: Studying the use of graphic elements in texts to convey information, revealing trends/patterns/relationships, communicate processes or display complicated data.

Writing: Letter Writing: Official Letters, Resumes

Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice

Vocabulary: Words often confused, Jargon

Unit 5

Lesson: Leaves from the Mental Portfolio of a Eurasian

Reading: Reading comprehension.

Writing: Writing structured essays on specific topics.

Grammar: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Vocabulary: Technical Jargon

Prescribed Textbooks:

1. Prabhavathi Y et al, *English All Round: Communication Skills for Undergraduate Students - 1*, Orient Black Swan, 2022

Reference Books:

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014.
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

Web Resources:

GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24AENG11T/21T.1	-	-	-	-	-	-	-	1	-	3	-	1
24AENG11T/21T.2	-	-	-	-	-	-	-	1	-	3	-	1
24AENG11T/21T.3	-	-	-	-	-	-	-	1	-	3	-	1
24AENG11T/21T.4	-	-	-	-	-	-	-	1	-	3	-	1
24AENG11T/21T.5	-	-	-	-	-	-	-	1	-	3	-	1

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Engineering Chemistry
Category: BS
Semester: I Semester
Couse Code: 24ACHE11T
Branch/es: CE & ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To familiarize engineering chemistry and its applications
2. To impart knowledge on hard water softening processes and the specifications for drinking water.
3. To train students on electrochemistry, corrosion control, and the properties and applications of various functional materials.
4. To know the significance of phase equilibria in system behavior.

Course Outcomes:

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

1. analyze the hardness of water and its treatment methods.
2. apply the principles of electrochemistry to energy storage and corrosion control.
3. explain the properties and applications of polymers & fuels.
4. explain the properties and applications of lubricants and building materials.
5. summarize the applications of phase rule and nanomaterials.

Unit 1 Water Technology 9

Soft and hardwater, Estimation of hardness of water by EDTA Method, Estimation of dissolved Oxygen - Boiler troubles –Priming, foaming, scale and sludge, Caustic embrittlement, Industrial water treatment – Specifications for drinking water, Bureau of Indian Standards (BIS) and World health organization (WHO) standards, Ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electrodialysis.

Unit 2 Electrochemistry and Corrosion 11

Electrodes –electrochemical cell, Nernst equation, cell potential calculations.

Primary cells – Zinc-air battery, Secondary cells –lithium-ion batteries- working principle of the batteries including cell reactions; Fuel Cells-Basic Concepts, the principle and working of hydrogen-oxygen Fuel cell.

Corrosion: Introduction to corrosion, Dry and electrochemical corrosion, differential aeration cell corrosion, Factors affecting the corrosion, Corrosion control-cathodic and anodic protection.

Unit 3 Polymers and Fuel Chemistry 10

Introduction to polymers, functionality of monomers, Mechanism of chain growth, step-growth, co-polymerization.

Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of PVC and Bakelite. Elastomers-Thiokol rubber-properties and applications

Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value; Liquid Fuels, refining of petroleum, Octane and Cetane Number-Determination of Calorific value of solids by Bomb Calorimeter.

Unit 4 Modern Engineering Materials 10

Refractories-Classification, Properties, Factors affecting the refractory materials and Applications. Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications.

Building materials- Manufacturing of Portland Cement, constituents, Setting and Hardening of cement.

Unit 5 Phase Rule and Nanomaterials 10

Phase Rule-Definition of terms – phase- components- degree of freedom- derivation of Gibbs phase rule-Significance and limitations of phase rule. Phase diagrams –one component system – H_2O– Two-component system – Eutectic systems - Pb-Ag system.

Nanomaterials – Classification, properties and applications of nanomaterials. Carbon based nanosized materials -CNT and Graphene-properties and applications.

Prescribed Textbooks:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010
3. B.R. Puri, L.R. Sharma, M.S. Pathania, Principles of Physical Chemistry, Vishal Publishing Company, 48 thEdition, 2021

Reference Books:

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition
3. S.S. Darer, S.S. Umare, A Text Book of Engineering Chemistry, S. Chand Publishing, 2011

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24ACHE11T/21T.1	3	3	2	2	-	-	2	-	-	-	-	1
24ACHE11T/21T.2	2	2	1	1	-	-	2	-	-	-	-	1
24ACHE11T/21T.3	2	2	1	1	-	-	2	-	-	-	-	1
24ACHE11T/21T.4	2	2	1	1	-	-	2	-	-	-	-	1
24ACHE11T/21T.5	2	2	1	1	-	-	2	-	-	-	-	1

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Chemistry	
Category:	BS	
Semester:	I Semester	II Semester
Couse Code:	24ACHE12T	24ACHE22T
Branch/es:	EEE, ECE, CSE-AI, AI&DS & CSE-ICB	CSE, CSE-DS, CSE-AIML & AIML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To familiarize engineering chemistry and its applications
2. To train the students on the principles and applications of electrochemistry and polymers
3. To introduce instrumental methods.
4. To know the need of green energy and e waste management

Course Outcomes:

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

1. apply quantum mechanics and molecular orbital theory to analyze bonding, energy levels, and bond order in various molecules.
2. explain the construction and working of various sensors, batteries and fuel cells.
3. explain the preparation, properties and applications of various polymers.
4. apply principles of various analytical techniques in the analysis of nanomaterials.
5. summarize various sustainable energy solutions and effective e-waste management.

Unit 1 Structure and Bonding Models 9

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ2, particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules– energy level diagrams of O2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

Unit 2 Electrochemistry and Applications 10

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, Types of electrodes-indictor and reference electrodes. Electrochemical sensors – potentiometric and amperometry sensors with examples.

Primary cells – Dry cell, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell– working of the cells

Unit 3 Polymer Chemistry 10

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, co-polymerization, with specific examples and mechanisms of polymer formation.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PV and Bakelite Elastomers–Buna-S, Buna-N–preparation and Thiokol -preparation, properties and applications.

Conducting polymers – polyacetylene– mechanism of conduction and applications

Unit 4 Nanomaterials and Instrumental Methods 9

Nanomaterials-Introduction, Classification, synthesis of nanomaterial by sol-gel method. Properties and applications of Carbon -based nanomaterials-CNT and Graphene.

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, Instrumentation and applications, potentiometry- potentiometric titrations (redox titrations), concept of

conductivity, conductivity cell, conductometric titrations (acid-base titrations). Chromatography-Basic Principle, Types-TLC- Principle, Instrumentation and Applications

Unit 5 Alternative Energy sources and e-Waste Management 9

Green Fuels: Introduction, construction and working of solar photovoltaic cell, applications. Generation of green hydrogen energy by electrolysis of water and its advantages.

e-Waste Management: Introduction, sources of e-waste, Composition and Health hazards of toxic materials present in electronic and electrical e-waste. Need of e-waste management -Recycling and Recovery; -Different approaches of recycling -Extraction of Gold from e-Waste.

Prescribed Textbooks:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010
3. Handbook of Hydrogen Energy: The Entire Hydrogen Systems, Dengwei Jing, Wiley, 2023
4. Electronic Waste: Toxicology and Public Health Issues, Bruce A. Fowler, Academic Press Inc; 1st edition,2017

Reference Books:

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007
2. J.D. Lee, Concise Inorganic Chemistry, 5th Edition, Wiley Publications, Feb.2008
3. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition
4. Handbook of Hydrogen Energy, Aldo Steinfeld, D. Yogi Goswami, E.K. Stefanakos, CRC Press, 2014

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24ACHE12T.1	3	2	1	2	-	-	2	-	-	-	-	1
24ACHE12T.2	3	2	1	2	-	-	2	-	-	-	-	1
24ACHE12T.3	2	2	1	1	-	-	2	-	-	-	-	1
24ACHE12T.4	2	2	1	1	-	-	2	-	-	-	-	1
24ACHE12T.5	3	3	2	2	-	-	3	-	-	-	-	1

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Applied Physics	
Category:	BS	
Semester:	I Semester	II Semester
Couse Code:	24APHY12T	24APHY22T
Branch/es:	CSE, CSE-DS, CSE-AIML & AIML	EEE, ECE, CSE-AI, AI&DS & CSE-ICB

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To impart knowledge in basic concepts of wave optics, Lasers and fiber optics.
2. To familiarize the Crystal structures and X-ray diffraction.
3. To explain the significant concepts of dielectrics, magnetic materials, semiconductors and superconductors in the field of engineering and their potential applications.

Course Outcomes:

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

1. apply interference, diffraction and polarization in engineering
2. describe crystal structures and X-ray diffraction
3. describe polarization of dielectrics and magnetic materials.
4. apply laser and fiber optics principles.
5. describe the properties and behavior of semiconductors and superconductors

Unit 1 Wave Optics

Interference: Introduction – Principle of superposition – Interference of light – Interference in thin films (Reflection Geometry)– Newton's Rings, Determination of wavelength – Engineering applications of interference.

Diffraction: Introduction – Fresnel and Fraunhofer diffractions – Fraunhofer diffraction due to single slit, double slit & Diffraction Grating - Grating spectrum – Dispersive power of Grating– Engineering applications of diffraction.

Polarization: Introduction –Types of polarization – Double refraction – Nicol's Prism – Half wave and Quarter wave plates – Engineering applications of polarization.

Unit 2 Crystallography and X-ray diffraction

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – 7 crystal systems- Bravais Lattices – coordination number – packing fraction of SC, BCC & FCC – Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law – X-ray Diffractometer –Laue's method and powder method.

Unit 3 Dielectric and Magnetic Materials

Dielectric Materials: Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors – Types of polarizations– Electronic, Ionic, Orientation (Qualitative) and Space charge (Qualitative) – Frequency dependence of polarization – Lorentz internal field – Clausius-Mossotti equation – Applications of dielectrics.

Magnetic Materials: Introduction – Magnetic dipole moment – Magnetization–Magnetic susceptibility and permeability –Origin of magnetic moments – Classification of magnetic materials: Dia, Para, Ferro, Anti-ferro & Ferri magnetic materials – Hysteresis – soft and hard magnetic materials – Applications of magnetic materials.

Unit 4 LASERs and Fiber Optics

LASERs: Introduction – characteristics of lasers – spontaneous and stimulated emission of radiation – Einstein's coefficients – population inversion – pumping mechanism – He-Ne laser – semiconductor laser – Applications of lasers.

Fiber Optics: Introduction - Optical Fiber construction – Working principle (Total Internal Reflection & critical Angle) – Acceptance angle & Numerical Aperture of optical fiber – Classification of fibers based on Refractive index profile & modes (Step index and Graded index optical fibers) – optical fiber losses – Block diagram of fiber optic communication – Medical and Sensor Applications.

Unit 5 Semiconductors and Superconductors

Semiconductors: Formation of energy bands – classification of solids on the basis energy band theory- Intrinsic and Extrinsic semiconductors – Drift and diffusion currents – Einstein's equation–Direct and indirect band gap semiconductors- Hall Effect and its applications.

Superconductors: Properties of superconductors– Meissner's effect – Type-1 and Type-2 Superconductors – BCS Theory – Josephson effect (AC & DC) – Applications of superconductors.

Prescribed Textbooks:

1. M. N. Avadhanulu, P. G. Kshirsagar & T. V. S. Arunmurthy, A Textbook of Engineering Physics, S. Chand Publications,11th edition, 2019
2. T Pradeep, A textbook of Nano Science and Nano Technology, Tata McGraw Hill, 2013
3. Charles Kittel, Introduction to Solid State Physics, Wiley Publications, 2011

Reference Books:

1. David J. Griffiths, Introduction to Electrodynamics, 4/e, Pearson Education, 2014
2. K. Thyagarajan, Applied Physics, McGraw Hill Education (India) Private Ltd, 2019
3. Gerd Keiser, Optical Fiber Communications, 4/e, Tata Mc Graw Hill, 2008

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24APHY12T/22T.1	3	2	1	2	-	-	-	-	-	-	-	1
24APHY12T/22T.2	2	2	1	1	-	-	-	-	-	-	-	1
24APHY12T/22T.3	2	2	1	1	-	-	-	-	-	-	-	1
24APHY12T/22T.4	3	2	1	2	-	-	-	-	-	-	-	1
24APHY12T/22T.5	2	2	1	1	-	-	-	-	-	-	-	1

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Matrix Theory and Calculus
Category: BS
Semester: I Semester
Couse Code: 24AMAT11T
Branch/es: Common to all branches

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To enlighten the learners in the concept of differential equations and multivariable calculus.
2. 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:

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

1. solve systems of linear equations
2. use the techniques of matrix algebra for engineering applications
3. apply the functions of several variables in optimization techniques
4. apply multiple integrals to find area of solids
5. estimate the work done against a field, circulation and flux using vector calculus

Unit 1 Matrices **10**

Rank of a matrix by echelon form, Normal form, Solving system of homogeneous and non-homogeneous linear equations, Eigen values and Eigen vectors and their properties.

Unit 2 Quadratic forms of matrices **8**

Cayley-Hamilton theorem (without proof), Finding inverse and power of a matrix by Cayley-Hamilton theorem, Diagonalization of a matrix, Quadratic forms and nature of the quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation.

Unit 3 Mean Value Theorems & Multivariable calculus **10**

Taylor's theorem and Maclaurin's theorem (without proofs) – Simple problems.
Partial derivatives, total derivatives, chain rule, change of variables, Jacobian, maxima and minima of functions of two variables, method of Lagrange multipliers for three variables.

Unit 4 Multiple Integrals **8**

Double integrals, change of order of integration, change of variables (Cartesian to polar), areas enclosed by plane curves, evaluation of triple integrals.

Unit 5 Vector Calculus **8**

Vector differentiation: Scalar and vector point functions, vector operator Del, Del applies to scalar point functions-Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl.
Vector integration: Line integral work done, surface integral, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems

Prescribed Textbooks:

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

Reference Books:

1. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013
3. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education
4. H. K. Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24AMAT11T.1	3	2	1	2	-	-	-	-	-	-	-	1
24AMAT11T.2	3	2	1	2	-	-	-	-	-	-	-	1
24AMAT11T.3	3	2	1	2	-	-	-	-	-	-	-	1
24AMAT11T.4	3	2	1	2	-	-	-	-	-	-	-	1
24AMAT11T.5	3	3	2	3	-	-	-	-	-	-	-	1

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Computational Problem Solving
Category: ESC
Semester: I Semester
Couse Code: 24ACSE11T
Branch/es: Common to all branches

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Understanding the steps in problem solving and formulation of algorithms to problems.
2. Develop programming skills as a means of implementing an algorithmic solution with appropriate control and data structures.
3. Develop intuition to enable students to come up with creative approaches to problems.
4. Develop programs using pointers, structures and unions.
5. Manipulation of text data using files.

Course Outcomes:

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

1. Formulate solutions to problems and represent those using algorithms/Flowcharts.
2. Choose proper control statements and use arrays for solving problems.
3. Decompose a problem into modules and use functions to implement the modules.
4. Apply and use allocation of memory for pointers and solve the problems related to manipulation of text data using files and structures.
5. Develop the solutions for problems using C programming Language.

Unit 1 Problem Solving and Introduction to C 9

Steps to solve problems, algorithm, Pseudo code, Flowchart with examples, Program Development. Environments. Introduction to programming: Programming languages and generations.
Introduction to C: Introduction, structure of C program, keywords, identifiers, Variables, data types, constants, I/O statements, operators, precedence and associatively

Unit 2 Introduction to decision control statements and Arrays 9

Selective, looping and nested statements, jumping statements.
Arrays: Introduction, declaration of arrays, accessing and storage of array elements, searching (linear and binary search algorithms) and sorting (selection and bubble) algorithms, multidimensional arrays, matrix operations

Unit 3 Strings and Functions 9

Strings: Declaration and Initialization, String Input / Output functions, String manipulation functions.
Functions: Types of functions, recursion, scope of variables and storage classes.
Preprocessor Directives: Types of preprocessor directives, examples

Unit 4 Pointers 9

Pointers: Understanding computer ‘s memory, introduction to pointers, declaration pointer variables, pointer arithmetic, pointers and strings, array of pointers, function pointers, dynamic memory allocation, advantages and drawbacks of pointers

Unit 5 Structures and Files 9

Structures: Structure definition, initialization and accessing the members of a structure, nested structures, array of structures, structures and functions, structures and pointers, self-referential structures, unions and enumerated data types.
Files: Introduction to files, file operations, reading and writing data on files, error handling during file operations.

Prescribed Textbooks:

1. C Programming and Data Structures. B.A. Forouzan, R. F.Gilberg, Cengage learning, Indian edition.
2. C and Data Structures, E.Balaguruswamy, Tata McGraw Hill.
3. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.

Reference Books:

1. LET US C, YeswanthKanitkar, Ninth Edition, BPB Publication.
2. Byron Gottfried, Schaum 's‖ Outline of Programming with C‖, McGraw-Hill.
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
4. A K Sharma —Computer Fundamentals and Programming‖, 2nd Edition, University Press, 2018.
5. PradeepDey and Manas Ghosh, —Programming in C‖, Oxford Press, 2ndEdition, 2017.
6. ReemaTharaja —Introduction to C Programming‖, Second Edition, OXFORD Press, 2015.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24ACSE11T.1	3	3	3	3	-	1	-	-	-	-	-	-
24ACSE11T.2	3	3	3	3	3	-	-	-	3	-	-	-
24ACSE11T.3	3	2	3	3	3	-	-	-	3	-	-	3
24ACSE11T.4	3	3	3	3	3	-	-	-	3	-	1	3
24ACSE11T.5	3	3	3	3	3	-	-	-	3	-	-	3

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Engineering Drawing	
Category:	ESC	
Semester:	I Semester	II Semester
Couse Code:	24AMEC11T	24AMEC21T
Branch/es:	CE, ME, EEE, ECE, CSE-AI, AI&DS & CSE-ICB	CSE, CSE-DS, CSE-AIML & AIML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	4	3

Course Objectives:

1. To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing.
2. To impart knowledge on the projection of points, lines and plane surfaces.
3. To improve visualization skills for better understanding of projection of solids.
4. To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.
5. To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

Course Outcomes:

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

1. Apply the appropriate annotations and geometric techniques to draw the conic sections, Cycloidal Curves and Involutes
2. Apply the principles of orthographic projection for engineering problems involving inclined lines to create drawings that represent real-world objects.
3. Apply the principles of orthographic projection for solving engineering problems of planes with respect to both reference planes.
4. Apply the principles of orthographic projection for solving engineering problems of solids.
5. Apply the conversion techniques to solve problems related to orthographic projections and isometric projection views.

Unit 1 **5**

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general method.

Engineering Curves:

Construction of Ellipse, Parabola and Hyperbola by General Method - Normal and tangent

Cycloid & Epicycloid curves (basic problem) - Normal and tangent

Involute of Square, Pentagon - Normal and tangent

Unit 2 **3**

Orthographic Projections: Reference plane, importance of reference lines or Planes, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane, Projections of Straight Line Inclined to both the reference planes.

Unit 3 **5**

Projections of Planes (Square, Circle, Pentagon, Hexagon): A Plane perpendicular to one reference plane and parallel to other, A plane Perpendicular to both reference planes, A plane perpendicular to one reference plane and inclined to the other, A plane inclined to both the reference planes.

Unit 4 **5**

Projections of Solids: Projections of solids (Prism, Pyramid, Cylinder and Cone): Axis perpendicular to Horizontal reference plane and parallel to other, Axis inclined to Horizontal reference plane and parallel to another plane.

Development of Surfaces: Simple Developments of a prism, cylinder, Pyramid and Cone

Unit 5 **5**

Isometric Projections / Views: Principles of Isometric Projection – Isometric Scale – Isometric Views of Lines, Planes, Conversion of orthographic views to isometric views (simple problems) and
Conversion of isometric views to orthographic views (simple problems)

Prescribed Textbooks:

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House
2. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill

Reference Books:

1. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc
2. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24AMEC11T/21T.1	3	2	1	2	-	-	-	1	-	1	-	1
24AMEC11T/21T.2	3	2	1	2	-	-	-	1	-	1	-	1
24AMEC11T/21T.3	3	2	1	2	-	-	-	1	-	1	-	1
24AMEC11T/21T.4	3	2	1	2	-	-	-	1	-	1	-	1
24AMEC11T/21T.5	3	2	1	2	2	-	-	1	-	1	-	1

ANNAMACHARYA UNIVERSITY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Engineering & IT Workshop	
Category:	ESC	
Semester:	I Semester	II Semester
Couse Code:	24AMEC12L	24AMEC22L
Branch/es:	CSE, CSE-DS, CSE-AIML & AIML	CE, ME, EEE, ECE, CSE-AI, AI&DS & CSE-ICB

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	4	3

Engineering Workshop Syllabus:

Course Objectives:

This course will enable the student to

1. Make familiar with different types of wooden joints.
2. Conversation with tools used in sheet metal work.
3. Develop electrical wiring skills.
4. Have practical exposure to metal joining processes.
5. Gain knowledge with tools used in Plumbing and Fitting

Course Outcomes:

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

1. Apply wood working skills to prepare different joints.
2. Develop sheet metal jobs with GI sheet.
3. Apply basic electrical engineering knowledge for house wiring practice.
4. Operate on different metal joining equipment.
5. Apply practical skills in trouble shooting the plumbing systems and various fittings.

Unit 1 Wood Working **6**

Familiarity with different types of woods and tools used in wood working and make the following joints. a)Cross- Lap joint b)Mortise and Tenon joint

Unit 2 Sheet Metal Working **6**

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheet.

a) rectangular tray b) Conical funnel

Unit 3 Electrical Wiring **6**

Familiarity with different types of basic electrical circuits and make the following connections.

a) Series connection and two switches, two bulbs in parallel connection.

b) Staircase connection and tube light connection.

Unit 4 Metal Joining process **9**

Familiarity with different types of tools used in metal joining process and practice on

a) Soldering

b) Brazing (preparation of Butt joint)

c) Arc welding (Preparation of Lap joint)

Unit 5 Demonstration & Practice **3**

Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same

diameter and with reducer for different diameters.
a) Tap Connection
(For practice: branches other than civil & mechanical.
For Demonstration: civil & mechanical Branch)
Demonstration and practice of fitting tools.
Familiarity with different types of tools used in fitting and do the following fitting exercises.
b) Square-Fit
c) Dove-tail Fit
(For practice: civil & mechanical.
For Demonstration: branches other than civil & mechanical.)

Prescribed Textbooks:

1. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 3rd Edn, Scitech publishers.

Reference Books:

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan, 2021-22.
4. Jeyapoovan T. and Pranitha S., Engineering Practices Lab Manual, 3rd Edn. Vikas Pub.2008.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24AMEC12L/ 24AMEC22L.1	3	3	1	-	-	-	-	1	2	2	-	2
24AMEC12L/ 24AMEC22L.2	3	3	2	-	-	-	-	1	2	2	-	2
24AMEC12L/ 24AMEC22L.3	3	3	1	-	-	-	-	1	2	2	-	2
24AMEC12L/24AMEC22L.4	3	3	1	-	-	-	-	1	2	2	-	2
24AMEC12L/ 24AMEC22L.5	3	3	1	-	-	-	-	1	2	2	-	2

IT WORKSHOP SYLLABUS

Course Objectives:

This course will enable the student to

1. Demonstrate the disassembling and assembling of a personal computer system.
2. Demonstrate the Installation the operating system and other software required in a personal computer system.
3. Introduce connecting the PC on to the internet from home and workplace and effective usage of the internet, Usage of web browsers, email, news groups and discussion forums.
4. Introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations.
5. To utilize Cloud based productivity enhancement and collaboration tools

Course Outcomes:

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

1. Recognize the peripherals of a computer, perform assembling and disassembling of various components of a computer.
2. Describe and perform installation and un-installation of Windows and Linux operating systems and also perform troubleshooting of various hardware and software components
3. Use Web browsers to access Internet, Search Engines
4. Use word processor; spread sheet, presentation and data storage tools

Task 1 **2**

Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report

Task 2 **2**

Assembling a computer: Disassemble and assemble the PC back to working condition. Students should be able. Student Students should record the process of assembling and troubleshooting a computer.

Task 3 **2**

Install Operating System: Student should install Linux on the computer. Students should record the entire installation process.

Task 4 **2**

Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc. should be done by the student. The entire process has to be documented.

Task 5 **2**

Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail accounts and send email. They should get acquainted with applications like Facebook, skype etc. If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, search process using different natural languages, and creating e-mail account

Task 6 **2**

Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Task 7 **4**

Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 8 **4**

Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 9 **4**

Presentations: creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper linking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Task 10 **2**

Store, sync, and share files with ease in the cloud-Google Drive
Document creation and editing text documents in your web browser- Google docs

Prescribed Textbooks:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. Upgrading and Repairing PC's, 22nd Edition, Scott Muller QUE, Pearson Education
3. Comdex Information Technology Course Kit, Vikas Gupta, WILEY Dreamtech
4. MOS 2010 Study Guide for Microsoft Word, Excel, PowerPoint, and Outlook Exams, 1st Edition, Joan Lambert, Joyce Cox, Microsoft Press

Reference Books:

1. IT Essentials PC Hardware and Software Companion Guide, CICSO Networking Academy
2. Network Your Computer & Devices Step by Step 1st Edition, CiprianRusen, Microsoft Press
3. Troubleshooting, Maintaining & Repairing PCs, 5th Edition, Bigelow, TMH
4. Introduction to computers, Peter Norton, 6/e, Mc Graw Hill
5. Cloud computing, productivity and collaboration tools, software and products offered by Google: https://en.wikipedia.org/wiki/G_Suite

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24AMEC12L/ 22L.1	3	3	3	-	3	-	-	-	-	-	-	3
24AMEC12L/ 22L.2	3	3	3	-	3	-	-	-	-	-	-	3
24AMEC12L/ 22L.3	3	3	3	-	3	-	-	-	-	-	-	3
24AMEC12L/22L.4	3	3	3	-	3	-	-	-	-	-	-	3
24AMEC12L/ 22L.5												

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Basic Electrical and Electronics Engineering Lab	
Category:	BS (LAB)	
Semester:	I Semester	II Semester
Couse Code:	24AEEE11L	24AEEE21L
Branch/es:	CE, ME, EEE, ECE, CSE-AI, AI&DS & CSE-ICB	CSE, CSE-DS, CSE-AIML & AIML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives:

1. To identify the various electrical and electronic components and devices.
2. To impart knowledge and practical exposure on various elements of electrical circuits, operational aspects of various electrical machines and electronic circuits.
3. To analyze the performance of rectifier circuits in practical approach.
4. To observe the characteristics of semiconductor devices.

Course Outcomes:

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

1. Identify the various Electrical and Electronic Components and Devices.
2. Analyze various characteristics of electrical circuits, electrical machines and measuring instruments.
3. Analyze the characteristics of various semiconductor devices through practical investigations.
4. Comprehend the usage of electronic devices as half wave and full wave rectifier.

List of Experiments

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCBs, Diodes, BJT)
2. Study and operation of
   - Multi-meters (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - CRO
3. Verification of KCL and KVL
4. Measurement of resistance by using Ammeter and Voltmeter method
5. Measurement of Earth Resistance using Megger
6. Magnetization Characteristics of DC shunt Generator
7. Brake Test on DC Shunt Motor
8. OC and SC Test on Single Phase Transformer
9. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias
10. Plot V – I characteristics of Zener Diode
11. Determination of Ripple Factor and Regulation of Half Wave Rectifier with and without capacitive filter
12. Determination of Ripple Factor and Regulation of Full Wave Rectifier with and without capacitive filter
13. Study of Cathode Ray Oscilloscope. (CRO)

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24AEEE11L/21L.1	1	1	1	1	-	-	-	-	-	-	-	1
24AEEE11L/21L.2	3	3	2	2	-	-	-	-	-	-	-	1
24AEEE11L/21L.3	3	3	2	2	-	-	-	-	-	-	-	1
24AEEE11L/21L.4	2	2	1	1	-	-	-	-	-	-	-	1

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	English Language Communication Skills Lab	
Category:	HSM (LAB)	
Semester:	I Semester	II Semester
Couse Code:	24AENG11L	24AENG21L
Branch/es:	CSE, CSE-DS, CSE-AIML & AIML	CE, ME, EEE, ECE, CSE-AI, AI&DS & CSE-ICB

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives: The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning. The students will get trained in the basic communication skills and also make them ready to face job interviews.

Course Outcomes:

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

1. improve their public speaking skills and make oral presentations effectively
2. apply communication skills through various language learning activities
3. analyze English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension
4. evaluate and exhibit professionalism in participating in role-plays, descriptions
5. create effective resonate and equip themselves with employability skills

List of Topics

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Just a Minute
4. Role Play / Situational Dialogues
5. Oral Presentation/ Poster Presentation
6. Information Transfer
7. Describing people/objects/situations

Advanced topics

1. E-mail Writing
2. Resume Writing, Cover letter, SOP
3. Group Discussions - Methods & Practice
4. Debates - Methods & Practice
5. Interviews Skills

Suggested Software

1. Walden Infotech
2. Sky Pronunciation Suite
3. Clarity Pronunciation Power – Part I
4. Learning to Speak English - 4 CDs
5. Loose Your Accent in 28 days, CD Rom, Judy Ravin

Reference Books:

1. Meenakshi Raman, Sangeeta-Sharma. Technical Communication. Oxford Press.2018.
2. Grant Taylor: English Conversation Practice, Tata McGraw-Hill Education India, 2016
3. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012.
4. T. Balasubramanyam, A Textbook of English Phonetics for Indian Students,(3rd Ed) Trinity Press.

Web Resources:

Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24AENG11L/21L.1	-	-	-	-	-	-	-	1	1	3	-	3
24AENG11L/21L.2	-	-	-	-	-	-	-	1	1	3	-	3
24AENG11L/21L.3	-	-	-	-	-	-	-	1	1	3	-	3
24AENG11L/21L.4	-	-	-	-	-	-	-	1	1	3	-	3
24AENG11L/21L.5	-	-	-	-	-	-	-	1	1	3	-	3

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Engineering Chemistry Lab
Category: BS (LAB)
Semester: I Semester
Couse Code: 24ACHE11L
Branch/es: CE & ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives: To verify the fundamental concepts with experiments.

Course Outcomes:
At the end of the course, the student will be able to
1. determine the Strength of an acid in secondary battery.
2. synthesize polymer and nano materials.
3. analyze the physical properties of functional materials.
4. estimate the Iron by colorimetry and volumetric methods.
5. analyze the hardness and Dissolved oxygen levels of various water samples.

List of experiments
1. Determination of Hardness of a groundwater sample.
2. Estimation of Dissolved Oxygen by Winkler's method.
3. Determination of Strength of an acid in Pb-Acid battery.
4. Preparation of a polymer (Bakelite).
5. Determination of percentage of Iron in Cement sample by colorimetry
6. Perpetration of elastomers-Thiokol Rubber.
7. Phase equilibria: Construction of the phase diagram using cooling curves or ignition tube method: Simple Eutectic System
8. Estimation of Ferrous by Dichrometry.
9. Determination of percentage Moisture content in a coal sample.
10. Determination of Viscosity of lubricating oil by Redwood Viscometer 1.
11. Determination of Calorific value of solid fuels by Bomb Calorimeter
12. Preparation of nanomaterials by precipitation method

Prescribed Textbooks:

1. Vogel's Quantitative Chemical Analysis, J. Mendham, R. C. Denney, J. D. Barnes and B. Sivasankar Pearson Publications, 6th Edition.
2. Physical Chemistry Laboratory Manual: An Interdisciplinary Approach, Ramesh Kumari Amirtha Anand, Dreamtech Press, 2020.
3. Investigations In the Use of The Bomb Calorimeter, J. Ns. August Fries, Volumes 86-100 Nabu Press, 2011.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24ACHE11L/21L.1	3	3	-	3	1	-	2	-	1	-	-	3
24ACHE11L/21L.2	3	3	-	3	1	-	2	-	1	-	-	3
24ACHE11L/21L.3	3	3	-	3	1	-	2	-	1	-	-	3
24ACHE11L/21L.4	3	3	-	3	1	-	2	-	1	-	-	3
24ACHE11L/21L.5	3	2	-	2	1	-	2	-	1	-	-	3

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Chemistry Lab	
Category:	BS (LAB)	
Semester:	I Semester	II Semester
Couse Code:	24ACHE12L	24ACHE22L
Branch/es:	EEE, ECE, CSE-AI, AI&DS & CSE-ICB	CSE, CSE-DS, CSE-AIML & AIML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives: Verify the fundamental concepts with experiments

Course Outcomes:

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

1. determine the cell constant and conductance of solutions.
2. Synthesize nanomaterials and polymers
3. determine the strength of an acid present in secondary batteries
4. analyze the methods of separation and measure absorption wavelengths of some organic compounds
5. estimate metal ions by using various analytical techniques.

List of experiments

1. Conductometric titration of strong acid vs. strong base.
2. Determination of cell constant and conductance of solutions.
3. Potentiometry - determination of redox potentials and emfs.
4. Determination of Strength of an acid in Pb-Acid battery.
5. Preparation of a Bakelite.
6. Preparation of Thiokol.
7. Determination of chromium (VI) in potassium dichromate by colorimeter.
8. Estimation of Zn by EDTA titration.
9. Preparation of nanomaterials by precipitation method.
10. Separation of components of a sample by Thin layer chromatography
11. Estimation of Ferrous Iron by Dichrometry.
12. Wavelength measurement of sample through UV-Visible Spectroscopy

Prescribed Textbooks:

1. Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publications by J. Mendham, 2009.
2. Physical Chemistry Laboratory Manual: An Interdisciplinary Approach, Ramesh Kumari Amirtha Anand, Dreamtech Press, 2020.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24CHE12L/22L.1	3	3	-	3	1	-	2	-	1	-	-	3
24CHE12L/22L.2	3	3	-	3	1	-	2	-	1	-	-	3
24CHE12L/22L.3	3	3	-	3	1	-	2	-	1	-	-	3
24CHE12L/22L.4	3	3	-	3	1	-	2	-	1	-	-	3
24CHE12L/22L.5	3	2	-	2	1	-	2	-	1	-	-	3

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course:	Applied Physics Lab	
Category:	BS (LAB)	
Semester:	I Semester	II Semester
Couse Code:	24APHY12L	24APHY22L
Branch/es:	CSE, CSE-DS, CSE-AIML & AIML	EEE, ECE, CSE(AI), AI&DS & CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Learn the concepts of interference , diffraction and their applications and the role of optical fiber parameters in communication.
2. Recognize the importance of energy gap in the study of conductivity and hall effect in a semiconductor.
3. Know about the magnetic and dielectric materials applications.
4. Apply the principles of semiconductors in various electronic devices

Course Outcomes:

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

1. estimate various optical parameters.
2. evaluate the various magnetic and dielectric properties.
3. estimate the properties of semiconductor materials.
4. evaluate the physical quantities of various materials.

List of Experiments

1. Determination of the thickness of the wire using wedge method.
2. Determination of the radius of curvature of the lens by Newton's ring method.
3. Determination of wavelength of light radiation using plane diffraction grating by spectrometer.
4. Determination of Dispersive power of a diffraction grating.
5. Determination of Particle size using laser.
6. Determination of dielectric constant by bridge resonance method.
7. Determination of Magnetic field along the axis of a circular coil carrying current by stewart-Gee's method.
8. Determination of Wavelength of laser by using Diffraction grating.
9. Determination of Hysteresis loss of ferro magnetic material by tracing B-H curve.
10. Determination of the numerical aperture and acceptance angle of an optical fiber.
11. Deterrmination of the rigidity modulus of metal wire by using torsional pendulum.
12. Determination of Hall coefficient and carrier concentration of a given semiconductor using Hall effect.
13. Determination of the resistivity of semiconductor by Four probe method.
14. Determination of the energy gap of a semiconductor by using P-N Junction diode.
15. Determination of resistance with varying temperature using thermister

Reference Books:

1. S. Balasubramanian, M.N. Srinivasan A Textbook of Practical Physics, S Chand Publishers, 2017
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24APHY12L/22L.1	3	3	1	1	2	-	-	-	-	-	-	3
24APHY12L/22L.2	3	3	1	1	2	-	-	-	-	-	-	3
24APHY12L/22L.3	3	3	1	1	2	-	-	-	-	-	-	3
24APHY12L/22L.4	3	3	1	1	2	-	-	-	-	-	-	3
24APHY12L/22L.5	3	3	1	1	2	-	-	-	-	-	-	3

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Computational Problem-Solving Lab
Category: ESC (LAB)
Semester: I Semester
Couse Code: 24ACSE11L
Branch/es: Common to all branches

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives:

1. Setting up programming environment.
2. Develop Programming skills to solve problems.
3. Use of appropriate C programming constructs to implement algorithms.
4. Identification and rectification of coding errors in program
5. Develop applications using a modular programming and Manage data using files

Course Outcomes:

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

1. Identify and setup program development environment
2. Implement the algorithms using C programming language constructs
3. Identify and rectify the syntax errors and debug program for semantic errors
4. Solve problems in a modular approach using functions
5. Implement file operations with simple text data

A minimum number of FOUR programs from each exercise is to be done students.

Data Types, Constants, Input and Output and expressions

Exercise 1: Data types, Variables, Constants and Input and Output.
Exercise 2: Operators, Expressions and Type Conversions.

Decision Control Statements and Arrays

Exercise 3: Conditional Statements [two way and multipath].
Exercise 4: Loop Control Statements. [for, while and do-While]
Exercise 5: Unconditioned JUMP Statements- break, continue, goto.
Exercise 6: Declaring Arrays, Referencing Arrays, Array Subscripts. Using for loop for sequential Access.
Exercise 7: Multidimensional Arrays

Strings and Functions

Exercise 8: String Basics, String Library Functions and Array of Strings.
Exercise 9: Simple user defined functions, Parameter passing methods- pass by value, pass by reference.
Exercise 10: Storage classes- Auto, Register, Static and Extern
Exercise 11: Recursive Functions, Preprocessor commands.
Exercise 12: Array Elements as Function Arguments

Pointers

Exercise 13: Pointers, Dynamic memory allocation and error handling

Structures and Files

Exercise 14: Structures

Exercise 15: File handling

Prescribed Textbooks:

1. C Programming and Data Structures. B.A. Forouzan, R. F.Gilberg,Cengage learning, Indian edition
2. C and Data Structures, E.Balaguruswamy, Tata McGraw Hill
3. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education

Reference Books:

1. Let Us C, YeswanthKanitkar, Ninth Edition, BPB Publication
2. A K Sharma —Computer Fundamentals and Programming‖, 2nd Edition, University Press, 2018
3. PradeepDey and Manas Ghosh, —Programming in C‖, Oxford Press, 2ndEdition, 2017
4. ReemaTharaja —Introduction to C Programming‖, Second Edition, OXFORD Press, 2015
5. https://www.cprogramming.com/
6. https://www.mycplus.com/tutorials/c-programming-tutorials

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24ACSE11L.1	3	3	-	3	3	-	-	-	3	1	1	-
24ACSE11L.2	3	3	-	-	-	-	-	-	3	-	-	-
24ACSE11L.3	3	3	3	3	-	-	-	-	3	-	-	3
24ACSE11L.4	3	3	3	3	-	-	-	-	-	-	-	3
24ACSE11L.5	3	3	3	3	-	-	-	-	-	-	-	3

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Foreign Language Elective
Category: HSM
Semester: I Semester
Couse Code: 24ALAN11T
Branch/es: Common to all branches

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	0	1

Course Objectives:

1. Enhance Language Skills: To provide students with the opportunity to learn a foreign language, thereby enhancing their global communication skills.
2. Cultural Awareness: To foster an understanding and appreciation of diverse cultures.
3. Flexible Learning: To offer a flexible learning platform where students can choose from a variety of reputable online courses.
4. Career Development: To improve employability by equipping students with additional language skills.
5. Academic Integration: To integrate MOOCs as a part of the formal curriculum and recognize the efforts of self-paced learning.

Guidelines:

1. **Course Selection:** Students can choose from the following languages:
    - German
    - French
    - Spanish
    - Arabic
2. **Approved Platforms:** Courses must be taken from recognized MOOC platforms such as NPTEL, Coursera, Udemy, or edX.
3. List of recommended courses:
    - German: https://www.udemy.com/course/german-course-for-beginners-learn-german
    - French: https://www.udemy.com/course/complete-french-course
    - Spanish: https://www.udemy.com/course/el-metodo-spanish-1
    - Arabic: https://www.udemy.com/course/arabic-a21/
4. Enrolment Verification: Students must submit proof of enrolment in the chosen course to the academic office of I Year at the beginning of the semester.
5. Minimum Course Duration: The selected course should be a minimum of 4 weeks in duration.
6. Progress Reports: Students are encouraged to submit progress reports periodically to their course mentor.
7. Completion Deadline: The course must be completed by the end of the semester.
8. Certificate Submission: Students must submit the certificate of completion issued by the MOOC platform to the Head, First Year Academics.

Policies

1. **Credit Allocation**: Upon successful completion and submission of the certificate, students will be awarded 1 academic credit.
2. **Grading**: The course will be graded on a Pass/Fail basis. A pass grade is awarded upon verification of the completion certificate.
3. **Integrity and Authenticity**: The submitted certificate must be authentic and verifiable. Any attempt to submit falsified documents will result in disciplinary action.
4. **Support**: Students can seek support from language faculty/course mentors if they encounter any difficulties during the course.

5. **Non-Completion**: Failure to complete the course within the stipulated time frame will result in no credit being awarded, and the elective will need to be retaken

A committee shall be formed at the level of the University to evaluate the grades / marks given for a course by external agencies and convert to the equivalent marks / grades. The recommended conversions and appropriate grades / marks are to be approved by the Academic Council of the University.

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Engineering Physics
Category: BS
Semester: II Semester
Couse Code: 24APHY21T
Branch/es: CE & ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To impart knowledge in basic concepts of Ultrasonics and elasticity.
2. To familiarize the Crystal structures and X-ray diffraction.
3. To explain the significant concepts of dielectrics, magnetic materials, and types of sensors
4. To describe the lasers and optical fibers in the field of engineering and their potential applications.

Course Outcomes:

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

1. apply ultrasonic waves and elastic principles in engineering
2. describe crystal structures and X-ray diffraction
3. describe polarization of dielectrics and magnetic materials.
4. apply laser and fiber optics principles.
5. describe the various types of sensors in engineering field

Unit 1 Ultrasonics and Elasticity

Ultrasonics: Introduction- Properties- Production of ultrasonic waves by magnetostriction and Inverse piezoelectric methods –Detection of ultrasonic waves by Kund's tube and Flame methods - Acoustic grating -Non-Destructive Testing – medical applications (Sonogram).

Elasticity: stress& strain - types of stress and strain- stress & strain curve - Hooke's law- Poisson's ratio- different elastic moduli: expression for young's modulus (Y), Bulk modulus (K) and rigidity modulus (η) - strain energy.

Unit 2 Crystallography and X-ray diffraction

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – 7 crystal systems- Bravais Lattices – coordination number – packing fraction of SC, BCC & FCC – Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law – X-ray Diffractometer –Laue's method and powder method.

Unit 3 Dielectric and Magnetic Materials

Dielectric Materials: Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors – Types of polarizations– Electronic, Ionic, Orientation (Qualitative) and Space charge (Qualitative) – Frequency dependence of polarization – Lorentz internal field – Clausius-Mossotti equation – Applications of dielectrics.

Magnetic Materials: Introduction – Magnetic dipole moment – Magnetization–Magnetic susceptibility and permeability –Origin of magnetic moments – Classification of magnetic materials: Dia, Para, Ferro, Anti-ferro & Ferri magnetic materials – Hysteresis – soft and hard magnetic materials – Applications of magnetic materials

Unit 4 LASERs and Fiber Optics

LASERs: Introduction – characteristics of lasers – spontaneous and stimulated emission of radiation – Einstein's coefficients – population inversion – pumping mechanism – He-Ne laser – semiconductor laser – Applications of lasers.

Fiber Optics: Introduction - Optical Fiber construction – Working principle (Total Internal Reflection & critical Angle) – Acceptance angle & Numerical Aperture of optical fiber – Classification of fibers based on Refractive index profile & modes (Step index and Graded index optical fibers) – optical fiber losses – Block diagram of fiber optic communication – Medical and Sensor Applications

Unit 5 Sensors

Sensors: (qualitative description only): Different types of sensors and applications - Strain and Pressure sensors- Piezoelectric sensor - Magnetostrictive sensors - Fiber optic methods of pressure sensor - Temperature sensors (Thermo couple and bimetallic strip) - Hall-effect sensor - pyroelectric sensor

Prescribed Textbooks:

1. M. N. Avadhanulu, P. G. Kshirsagar & T. V. S. Arunmurthy, A Textbook of Engineering Physics, S. Chand Publications,11th edition, 2019
2. T Pradeep, A textbook of Nano Science and Nano Technology, Tata McGraw Hill, 2013
3. Charles Kittel, Introduction to Solid State Physics, Wiley Publications, 2011

Reference Books:

1. David J. Griffiths, Introduction to Electrodynamics, 4/e, Pearson Education, 2014
2. K. Thyagarajan, Applied Physics, McGraw Hill Education (India) Private Ltd, 2019
3. Gerd Keiser, Optical Fiber Communications, 4/e, Tata Mc Graw Hill, 2008

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24APHY11T/21T.1	3	2	1	2	-	-	-	-	-	-	-	1
24APHY11T/21T.2	2	2	1	1	-	-	-	-	-	-	-	1
24APHY11T/21T.3	2	2	1	1	-	-	-	-	-	-	-	1
24APHY11T/21T.4	3	2	1	2	-	-	-	-	-	-	-	1
24APHY11T/21T.5	2	2	1	1	-	-	-	-	-	-	-	1

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Differential Equations and Transform Techniques
Category: BS
Semester: II Semester
Couse Code: 24AMAT22T
Branch/es: Common to all branches

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To enlighten the learners in the concept of differential equations and multivariable calculus.
2. 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:

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

1. apply the knowledge of the higher order differential equations in electrical circuit problems
2. solve the standard partial differential equations.
3. apply the Laplace transformations for different types of functions
4. solve the ordinary differential equations using Laplace transformations
5. apply Fourier series and Fourier transforms in engineering

Unit 1 Linear differential equations of higher order with constant Coefficients 10

Basic concepts - general solution-operator D-rules for finding complimentary function-inverse operator-rules for finding particular integral for RHS term of the type $e^{ax}, \sin ax / \cos ax$, polynomials in x, $e^{ax} \sin ax / e^{ax} \cos ax / e^{ax} x^n, x \sin ax / x \cos ax$ -method of variation of parameters

Unit 2 Partial Differential Equations 8

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method, non-linear PDEs (Charpit's method), method of separation of variables for second order linear Partial Differential Equations.

Unit 3 Laplace transforms 8

Laplace transforms of standard functions- First shifting theorem - change of scale property - multiplication by tn - division by t - transforms of derivatives and integrals - Laplace transform of periodic functions (without proofs).

Unit 4 Inverse Laplace transforms 8

Inverse Laplace transforms (without proofs) – Convolution theorem (without proof).
Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

Unit 5 Fourier series and Fourier Transforms 10

Fourier series: Dirichlet conditions - functions of any period - odd and even functions - half range series.
Fourier Transforms: Fourier integrals - Fourier cosine and sine integrals - Fourier transform - sine and cosine transform.

Prescribed Textbooks:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition

2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition
2. Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. Higher Engineering Mathematics, B. V. Ramana, , McGraw Hill Education, 2017

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24AMAT22T.1	3	2	1	2	-	-	-	-	-	-	-	1
24AMAT22T.2	3	2	1	2	-	-	-	-	-	-	-	1
24AMAT22T.3	3	2	1	2	-	-	-	-	-	-	-	1
24AMAT22T.4	3	2	1	2	-	-	-	-	-	-	-	1
24AMAT22T.5	3	2	1	2	-	-	-	-	-	-	-	1

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Engineering Mechanics
Category: ESC
Semester: II Semester
Couse Code: 24ACIV21T
Branch/es: CE & ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Develop a solid understanding of fundamental principles of force systems and equilibrium in engineering mechanics.
2. Equip students with analytical skills to solve structural problems, including trusses and frictional systems, using appropriate methods.
3. Introduce concepts of centroids, centers of gravity, and moments of inertia for different surfaces and volumes.
4. Provide a comprehensive understanding of the kinematics and kinetics of rigid bodies, including motion analysis under various conditions.
5. Enable students to apply the principles of work, energy, momentum, and impulse in engineering scenarios, fostering problem-solving abilities.

Course Outcomes:

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

1. Understand and apply the fundamental principles of force systems, including the resolution and composition of forces and the concept of equilibrium.
2. Analyze structures like plane trusses using the method of joints and sections and understand the principles of friction in engineering applications.
3. Determine the centroid, center of gravity, and moment of inertia for various surfaces and volumes, applying these concepts to engineering problems.
4. Solve problems related to the kinematics of rigid bodies, including projectile motion, rotation, and plane motion.
5. Apply principles of dynamics, such as Newton's Laws and D'Alembert's principle, to analyze the motion of bodies, and understand energy conservation, momentum, and impulse in ideal systems.

Unit 1 Introduction to Engineering Mechanics 10

Introduction to Engineering Mechanics: Composition and resolution of forces, parallelogram law, principle of transmissibility, types of force systems - concurrent and concurrent coplanar forces, resultant of coplanar force systems couple, moment of a force Varignon's theorem, concept of free body diagrams, concept of equilibrium of coplanar force and non-coplanar systems.

Unit 2 Analysis of Structures and Friction 10

Introduction to plane trusses, analysis of plane trusses by method of joints and method of sections. Friction: Laws of friction, types of friction, equilibrium of force systems involving frictional forces, wedge friction. Free body diagrams involving frictional forces.

Unit 3 Properties of Surfaces and Moment of Inertia 10

Properties of Surfaces and Volumes: Centroid and center of gravity, derivation of centroids from first moment of area, centroids of composite sections, center of gravity of common volumes - cylinder, cone, sphere, theorem of Pappus-guldinus. Moment of Inertia: Area moment of inertia of plane and composite

shapes, parallel axis theorem, perpendicular axis theorem, polar moment of inertia, mass moment of inertia of common volumes -thin plates, thin rod, cylinder, cone, sphere, rectangular prism, radius of gyration.

Unit 4 Kinematics 10

Equations of motion for rigid bodies, constant and variable acceleration, rectilinear and curvilinear motion, motion under gravity -projectile motion, use of rectangular coordinates, tangential and normal coordinates, radius of curvature, rotation of a rigid body about a fixed axis, introduction to plane motion.

Unit 5 Kinetics and Ideal Systems 10

Kinetics: Principles of dynamics - Newton's Laws of motion, D'Alembert's principle in rectilinear translation, principle of work and energy. Ideal Systems: Principle of conservation of energy, concept of power, conservation of linear and angular momentum, principle of momentum and impulse, impact - types of impact.

Prescribed Textbooks:

1. Engineering Mechanics: Statics and Dynamics by J.L. Meriam and L.G. Kraige
2. Engineering Mechanics by R.C. Hibbeler
3. Engineering Mechanics: Statics and Dynamics by F.P. Beer, E.R. Johnston, and D.F. Mazurek
4. Engineering Mechanics by Timoshenko and Young.

Reference Books:

1. Vector Mechanics for Engineers: Statics and Dynamics by Ferdinand P. Beer and E. Russell Johnston
2. Mechanics for Engineers: Statics and Dynamics by J.L. Meriam and L.G. Kraige
3. Engineering Mechanics: Dynamics by A.K. Tayal
4. Introduction to Mechanics by Irving H. Shames
5. An Introduction to Mechanics by Daniel Kleppner and Robert J. Kolenkow
6. Schaum's Outline of Engineering Mechanics: Statics and Dynamics by E. Nelson, C. Best, and W. McLean.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24ACIV21T.1	3	3	2	1	-	-	-	-	1	1	-	-
24ACIV21T.2	3	3	2	2	1	-	-	-	2	2	-	-
24ACIV21T.3	3	2	2	2	-	-	-	-	-	2	-	-
24ACIV21T.4	3	2	2	2	-	-	-	-	1	1	-	-
24ACIV21T.5	3	3	2	2	1	-	-	-	1	2	-	-

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Fundamentals of Electronic Devices and Circuits
Category: ESC
Semester: II Semester
Couse Code: 24AECE21T
Branch/es: EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To analyses the transistor biasing circuits.
2. To understand the amplification action of BJT and its h-parameter models.
3. To understand the operation and Characteristics of FET.
4. To analyses the FET biasing circuits.
5. To understand the working principles of special purpose electronic diodes.

Course Outcomes:

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

1. Analyses the transistor biasing circuits.
2. Understand the amplification action of BJT and its h-parameter models.
3. Understand the operation and Characteristics of FET.
4. Analyses the FET biasing circuits.
5. Understand the working principles of special purpose electronic diodes.

Unit 1 Transistor Biasing **9**

Bias Stability - Need for Stabilization – Stabilization Factors (s, s1, s11) – Types of Biasing-Fixed Bias, Collector to Base bias, Emitter-Stabilized bias, Voltage Divider Bias. Simple numerical problems.

Unit 2 Single Stage Amplifiers **9**

Single Stage Transistor Amplifier- Transistor Amplifying Action – Practical circuit of Transistor Amplifier- Classification of Amplifiers- Amplifier equivalent circuit – Concept of h-parameters – Analysis of CE, CB and CC Amplifiers – Comparisons of CE,CB and CC. Simple numerical problems.

Unit 3 Field Effect Transistors **9**

Construction of JFETs – Types – Operation - Characteristics - Construction and Characteristics of MOSFETs– Depletion type MOSFETs–Enhancement type MOSFET.

Unit 4 FET Biasing **9**

FET Biasing: Fixed Bias Configuration–Self Bias Configuration–Voltage Divider Biasing. Simple numerical problems.

Unit 5 Special Purpose Electronic Devices **9**

LED, Tunnel Diode, PIN Diode, SCR, UJT, Photo diode, Photo transistor, Varactor diode, Introduction to wide band gap devices, SiC, GaN and their applications.

Prescribed Textbooks:

1. Electronic Devices and Circuits, David A Bell, Fifth Edition, 2008, Oxford University Press.
2. Electronic Devices and Circuits, J. Millman and Halkias, 1991 edition, 2008, TMH.

Reference Books:

1. Electronic Devices and Circuit Theory, Robert L. Boylestad and Louis Nashelsky, 9th edition,PHI.
2. Principles of Electronics, V. K. Mehta, S. Chand Publications2004
3. Integrated Electronics, Analog and Digital Circuits and Systems, J. Millman and Halkias,TMH.
4. Micro Electronic Circuits, Sedra and Smith, Oxford University Press

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24AECE21T.1	-	3	2	-	-	-	-	1	-	-	1	-
24AECE21T.2	-	3	3	-	1	-	-	2	-	-	1	-
24AECE21T.3	-	3	2	-	1	-	-	1	-	-	2	-
24AECE21T.4	-	3	2	-	1	-	-	1	-	-	2	-
24AECE21T.5	-	3	2	-	1	-	-	1	-	-	1	-

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Electronic Devices and Circuits
Category: ESC
Semester: II Semester
Couse Code: 24AECE22T
Branch/es: ECE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Students will be able to understand the basic principles of all semiconductor devices.
2. Able to analyze diode circuits, various biasing and small signal equivalent circuits of amplifiers, compare the performance of BJTs and MOSFETs
3. Able to design rectifier circuits and various amplifier circuits using BJTs and MOSFETs.

Course Outcomes:

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

1. Understand principle of operation, characteristics and applications of Semiconductor diodes, Bipolar Junction Transistor and MOSFETs.
2. Applying the basic principles solving the problems related to Semiconductor diodes, BJTs, and MOSFETs.
3. Analyze diode circuits for different applications such as rectifiers, clippers and clampers also analyze biasing circuits of BJTs, and MOSFETs.
4. Design of diode circuits and amplifiers using BJTs, and MOSFETs.
5. Compare the performance of various semiconductor devices.

Unit 1 Diodes **14**

PN junction diode: Band structure of PN Junction, Quantitative Theory of PN Diode, types of PN junction diode, VI Characteristics, PN diode current equation, Diode resistance, Transition and Diffusion Capacitance, effect of temperature on PN junction diode, Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Ripple Factor and Regulation Characteristics, Clipping and Clamping circuits, Voltage doubler, Illustrative problems.

Special Diodes: Zener and Avalanche Breakdowns, VI Characteristics of Zener diode, Zener diode as voltage regulator, Construction, operation and VI characteristics of Tunnel Diode, Varactor Diode, LED, LCD, Photo Diode, SCR and UJT.

Unit 2 BJT Biasing & Stabilization **12**

Bipolar Junction Transistors: Transistor construction, BJT Operation, Transistor as an Amplifier and as a Switch, Common Emitter, Common Base and Common Collector Configurations, Limits of Operation, BJT Specifications.

Biasing and Stabilization: Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Collector to Base Bias, Self-Bias, Bias Stability, Thermal Runaway, Thermal Stability, Illustrative problems.

Unit 3 MOS Field Effect Transistors **12**

Introduction, Device Structure and Physical Operation, CMOS, V - I Characteristics, MOSFET Circuits at DC, MOSFET as an Amplifier and as a Switch. Biasing in MOS Amplifier circuits - biasing by fixing VGS with and without source resistance, biasing using drain to gate feedback resistor, biasing using constant current source, body effect, Problem solving.

Unit 4 BJT Small Signal Operation and Models 12

The transconductance, input resistance at the base, input resistance at the emitter, Voltage gain, separating the Signal and the DC Quantities, The Hybrid π Model, the T Model. Single Stage BJT Amplifiers - Common-Emitter (CE) amplifier without and with emitter resistance, Common-Base (CB) amplifier, Common-Collector (CC) amplifier or Emitter Follower, Problem solving.

Unit 5 MOSFET Small Signal Operation Models 12

The dc bias, separating the DC analysis and the signal analysis, small signal equivalent circuit models, the transconductance, the T equivalent circuit model, Single stage MOS Amplifiers – common source (CS) amplifier without and with source resistance, common gate (CG) amplifier, source follower, Problem Solving.

Prescribed Textbooks:

1. Adel S. Sedra and Kenneth C. Smith, "Microelectronic Circuits – Theory and Applications", 6th Edition, Oxford Press, 2013.
2. J. Milliman and C Halkias, "Integrated electronics", 2nd Edition, Tata McGraw Hill, 1991.

Reference Books:

1. Donald A Neamen, "Electronic Circuits – analysis and design", 3rd Edition, McGraw Hill (India), 2019.
2. Behzad Razavi, "Microelectronics", Second edition, Wiley, 2013.
3. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits," 9th Edition, Pearson, 2006.
4. Jimmie J Cathey, "Electronic Devices and Circuits," Schaum's outlines series, 3rd edition, McGraw-Hill (India), 2010.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24AECE22T.1	2	2	1	1	-	-	-	1	-	-	-	-
24AECE22T.2	3	2	1	2	-	-	-	1	-	-	-	-
24AECE22T.3	3	3	2	2	-	-	-	1	-	-	-	-
24AECE22T.4	3	3	3	3	-	-	-	1	-	-	-	-
24AECE22T.5	2	2	1	1	-	-	-	1	-	-	-	-

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Data Structures
Category: ESC
Semester: II Semester
Couse Code: 24ACSE22T
Branch/es: CSE, AI&DS, AIML, CSE(ICB), CSE(AI), CSE(DS), CSE(AIML)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Understand the significance of linear data structures in problem-solving and basic time/space complexity analysis.
2. Create and manage linked lists to efficiently organize and manipulate data, emphasizing memory efficiency.
3. Implement and apply stacks and queues to manage program flow and solve problems involving expression evaluation and backtracking.
4. Understand the importance of non-linear data structures Tress and Graphs.
5. Explore basic concepts of hashing and apply it to solve problems requiring fast data retrieval and management.

Course Outcomes:

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

1. understand the role of linear data structures in organizing and accessing data efficiently in algorithms
2. design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation
3. develop programs using stacks and queues to solve related problems
4. implement non-linear data structures such as trees and graphs
5. recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

Unit 1 Introduction to Linear Data Structures 9

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures.

Unit 2 Linked Lists 9

Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.

Unit 3 Stacks, Queues and De-queues 9

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.

De-queues: Introduction to De-queues (double-ended queues), Operations on De-queues and their applications.

Unit 4 Introduction to non-linear Data Structures 9

Trees: Introduction to Trees, Binary Trees, creation of binary tree, Operations on Binary Tree. Introduction to Binary Search Tree, Operations on Binary Search Trees.

Graphs: Defining graph, basic terminology, graph representation.

Unit 5 Hashing 9

Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.

Prescribed Textbooks:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, Silicon Press, 2008

Reference Books:

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein.
5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms, Robert Sedge wick

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
23A0521T.1	3	3	3	3	-	-	-	-	-	-	3	3
23A0521T.2	3	3	3	3	-	-	-	-	-	-	-	3
23A0521T.3	3	3	3	-	-	-	-	-	-	-	-	3
23A0521T.4	3	3	3	3	-	-	-	-	-	2	-	3
23A0521T.5	3	3	3	3	2	-	-	-	-	-	-	3

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Computer Applications in Civil Engineering
Category: ESC
Semester: II Semester
Couse Code: 24ACIV22T
Branch/es: CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Understand the theoretical concepts behind computer applications in civil engineering.
2. Gain knowledge of various software tools and their theoretical underpinnings.
3. Learn about the applications and limitations of computational methods in civil engineering.
4. Explore the future trends and emerging technologies in the field.

Course Outcomes:

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

1. Understand the Role of Computer Applications.
2. Apply CAD Techniques.
3. Conduct Structural Analysis.
4. Analyze Spatial Data with GIS.
5. Evaluate Emerging Technologies.

Unit 1 Introduction to Computer Applications in Civil Engineering 10

- **Overview of Computer Applications:**
  - Importance and evolution of computer applications in civil engineering.
  - The impact of technology on design, analysis, and management processes.
- **Fundamentals of Computer Programming:**
  - Introduction to programming languages relevant to civil engineering (e.g., Python, MATLAB).
  - Theoretical concepts of algorithms, flowcharts, and pseudocode.
  - Data types, control structures, and basic programming logic.

Unit 2 Computer-Aided Design (CAD) 10

- **Principles of CAD:**
  - Theoretical foundation of CAD systems.
  - Geometric modeling techniques and coordinate systems.
  - Transformations and representation of 2D and 3D objects.
- **Advanced CAD Concepts:**
  - Parametric and non-parametric modeling.
  - Theory of constraints, dependencies, and layers in CAD.
  - Surface and solid modeling techniques.

Unit 3 Structural Analysis and Project Management Software 10

- **Structural Analysis:**
  - Theoretical foundations of structural analysis.
  - Introduction to the Finite Element Method (FEM) and its applications.
  - Overview of structural analysis software tools (e.g., STAAD.Pro, ETABS).
- **Project Management Principles:**
  - Theoretical concepts of project management.

- Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT).
- Software tools for project scheduling, resource management, and progress tracking.

Unit 4 Geographical Information Systems (GIS) and Numerical Methods 10

- **Geographical Information Systems (GIS):**
  - Fundamentals of GIS and spatial data representation.
  - Theoretical concepts of spatial analysis, data layers, and map projections.
  - Applications of GIS in civil engineering, urban planning, and environmental management.
- **Numerical Methods in Civil Engineering:**
  - Introduction to numerical methods for solving engineering problems.
  - Theoretical background of numerical solutions to algebraic and differential equations.
  - Error analysis, stability, and convergence in numerical computations.

Unit 5 Emerging Technologies and Future Trends in Civil Engineering 10

- **Building Information Modeling (BIM):**
  - Concepts and principles of BIM.
  - Theoretical aspects of information modeling, data integration, and collaboration.
  - Benefits and challenges of BIM implementation in civil engineering projects.
- **Simulation, Data Analysis, and Visualization:**
  - Theoretical foundations of simulation techniques in civil engineering.
  - Statistical methods for data analysis and their applications.
  - Data visualization techniques and tools for engineering decision-making.
- **Emerging Technologies:**
  - Overview of emerging technologies (e.g., Artificial Intelligence, Internet of Things, Blockchain).
  - Theoretical basis of these technologies and their potential impact on civil engineering.
  - Ethical considerations and sustainability in the adoption of new technologies.

Prescribed Textbooks:

1. **"Computer-Aided Design and Drafting"** by Madsen, D.
2. **"Structural Analysis: A Unified Classical and Matrix Approach"** by Amin Ghali, Adam Neville, and Tom G. Brown.
3. **"Project Management: A Systems Approach to Planning, Scheduling, and Controlling"** by Harold Kerzner.
4. **"Geographical Information Systems: Principles, Techniques, Management and Applications"** by Paul A. Longley, Michael F. Goodchild, David J. Maguire, and David W. Rhind.
5. **"Numerical Methods for Engineers"** by Steven C. Chapra and Raymond P. Canale.
6. **"Building Information Modeling: Planning and Managing Construction Projects with 4D CAD and Simulations"** by Willem Kymmell.

Software tools Discussed:

1. AutoCAD
2. STAAD.Pro / ETABS
3. MS Project / Primavera
4. ArcGIS / QGIS
5. Revit
6. ANSYS / SAP2000
7. MS Excel
8. MATLAB / Python

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24CIV21T.1	3	2	2	1	2	2	2	1	2	2	1	2
24CIV21T.2	3	2	3	2	3	1	1	1	2	2	2	2
24CIV21T.3	3	3	3	3	3	2	2	2	2	2	3	2
24CIV21T.4	3	3	2	3	3	2	2	1	2	2	2	3
24CIV21T.5	3	2	3	2	3	3	3	2	2	2	3	3

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: The Joy of Computing Using Python
Category: ESC
Semester: II Semester
Couse Code: 24ACSE23T
Branch/es: ME, CSE, AI&DS, AIML, CSE(ICB), CSE(AI), CSE(DS) & CSE(AIML)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To learn basics of computational problem solving, python programming and basic control structures.
2. To understand python programming basic constructs like lists, dictionaries, sets and functions.
3. To apply module design and usage of text files in python programming.

Course Outcomes:

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

1. Understand computational problem solving and basic elements of python programming.
2. Construct python programming basic constructs like lists, tuple, dictionaries, and sets.
3. Implement string processing and exception handling in programming.
4. Analyze string processing and exception handling in programming.
5. Reframe programs using class and object in python programming.

Unit 1 Introduction to python programming language

Introduction to python programming language, literals, variables and identifiers, operators, expressions and data types. Control Structures: Boolean expressions, selection control, and iterative control.

Unit 2 Lists

Lists: List structures, lists in python, iterating over lists in python, more on python lists. Dictionaries and sets, tuple.

Unit 3 Functions

Functions: Program routines, more on functions, Module Design: Modules, Top-Down design, python modules.

Unit 4 Text Files

Text Files: Text File, Using Text files, string processing, exception handling.

Unit 5 Introduction to object-oriented programming

Introduction to Object oriented programming: class, three fundamental features of object-oriented programming, encapsulation-what is encapsulation, defining classes in python. Inheritance: subtypes, defining subclasses in python, Polymorphism: use of polymorphism.

Prescribed Textbooks:

1. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, Charles Dierbach.

Reference Books:

1. Python Programming using problem solving approach, ReemaThareja, Oxford University press.
2. Python Programming: An Introduction to Computer Science, John Zelle, Franklin,Beedle & Associates Inc.,3rd Edition.
3. Think Python: How to think like a computer Scientist, Allen Downey 2nd Edition O'Reilly Publications.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24ACSE23T.1	3	-	3	-	-	-	-	-	-	-	-	3
24ACSE23T.2	3	-	3	3	-	-	-	-	-	-	-	3
24ACSE23T.3	3	-	3	3	-	-	-	-	-	-	-	3
24ACSE23T.4	3	-	3	3	-	-	-	-	-	-	-	3
24ACSE23T.5	3	-	3	3	-	-	-	-	-	-	-	3

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Electrical Circuits-I
Category: ESC
Semester: II Semester
Couse Code: 24AEEE22T
Branch/es: EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To learn a number of powerful engineering circuit analysis techniques such as nodal analysis, mesh analysis and graph theory
2. To learn the concepts of reactance and impedance to analyze simple a.c. circuits and methods to calculate power and power factor
3. To analyze two port network parameters,
4. To solve complex circuits using Network theorems.
5. To understand frequency response in electrical circuits and clear understanding of the important parameters of coupled circuits

Course Outcomes:

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

1. Apply the concepts of mesh and nodal analysis and analyze electrical circuits using graph theory.
2. Understand the basic concepts of 1-phase ac circuits
3. Analyze the calculation of two port Network parameters.
4. Analyze the circuit using Network theorems.
5. Analyze resonant circuits and coupled circuits.

Unit 1 Network Analysis 9

Star delta conversion, source transformation, voltage division and current division, Mesh and Super Mesh, Nodal and Super Node analysis, Network Topology– Graph – Tree, Basic Cutset and Basic Tieset Matrices for Planar Networks –Problems, Network equilibrium equations using topology. Duality & Dual Networks-Problems.

Unit 2 Fundamentals of 1-ϕ ac circuits 9

Advantages of AC supply, Types of AC waveforms, Importance of Sine Wave, Basic definitions: Cycle. Time period, frequency, Peak value, peak –peak value. Determination of Average, R.M.S Values, Peak and Form Factor for different Periodic Waveforms, Phase and Phase Difference, j-notation, Steady State Analysis of R, L and C with Sinusoidal Excitation, Concept of Reactance, Impedance, Susceptance and Admittance, Real and Reactive Power, Complex Power, Concept of Power Factor. Analysis of Single-Phase ac Circuits-Problems.

Unit 3 Two port networks 9

Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters and Their Relations, Condition for Reciprocity and Symmetry-inter connections.

Unit 4 Network Theorems 9

Superposition, Thevenin ‘s, Norton ‘s, Maximum Power Transfer, Millman’s, Reciprocity, Substitution and Tellegen‘s Theorems for DC and AC excitations.

Unit 5 Resonance & magnetically coupled circuits: 9

Resonance – Definition, Resonant frequency, bandwidth and Q-factor for series and parallel resonant circuits, Problems. Magnetically Coupled Circuits: Coupled circuits – self & mutual inductance, Dot convention, Coefficient of coupling-Analysis of Coupled Circuits.

Prescribed Textbooks:

1. Sudhakar & Shyam Mohan s Palli. Circuits and Networks 5th Edition, Tata McGraw Edition (India) Private Limited, 2015.
2. A. Chakrabarti. Circuit Theory. 6th edition, Dhanpat Rai& Co, New Delhi, 2014.

Reference Books:

1. M.E. Van Valkenberg. Network Analysis. 3rd edition, Pearson Publications, New Delhi 2006.
2. William H. Hayt& Jack E. Kennedy & Steven M. Durbin. Engineering Circuit Analysis. 8th edition, TATA McGraw Hill Company, 2013.
3. J.A.Edminister & M.D.Nahvy. Theory and Problems of Electric Circuits. 4th Edition Schaums Outline series, New Delhi TATA McGraw Hill Company, 2004.
4. G. K. Mittal, Ravi Mittal. Network Analysis. 14th Edition, Khanna Publishers, New Delhi, 1997.
5. C. K. Alexander and M. N. O. Sadiku. Fundamentals of Electric Circuits. 5th Edition, Tata McGraw hill Publishing Company Limited, New Delhi, 2012.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24AEEE22T.1	3	2	-	-	-	-	-	-	-	-	-	-
24AEEE22T.2	3	2	-	-	-	-	-	-	-	-	-	-
24AEEE22T.3	3	2	2	1	1	-	-	-	-	-	-	-
24AEEE22T.4	3	2	2	1	-	-	-	-	-	-	-	-
24AEEE22T.5	3	2	2	1	-	-	-	-	-	-	-	-

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Network Analysis
Category: ESC
Semester: II Semester
Couse Code: 24AEEE23T
Branch/es: ECE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the basics of electrical circuits.
2. To understand the fundamentals of AC circuits and resonance.
3. To learn and define the various parameters to characterize two-port networks.
4. To solve electrical circuits using network theorems.
5. To analyze the transient response of RL, RC and RLC series circuits

Course Outcomes:

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

1. Apply fundamental laws to solve electrical circuits.
2. Analyze 1-Φ ac circuits and resonance.
3. Determine two port network parameters.
4. Apply network theorems to solve complex electrical circuits.
5. Analyze dc transient response of RL, RC and RLC series circuit.

Unit 1 Basic of Electrical Circuits 10

Basic Electrical Circuits: Network reduction techniques, star & delta transformations, source transformation, nodal & mesh analysis, super node & super mesh concepts – problems (with independent dc sources only).

Unit 2 Fundamentals of AC Circuits & Resonance 10

Fundamentals of AC Circuits: Advantages of ac supply, types of waveforms, importance of sinusoidal waveforms, cycle, time period, frequency & amplitude, sinusoidal steady state analysis of RL, RC and RLC series circuits, phasors, complex power.

Resonance: Resonant frequency, bandwidth & Q-factor for series and parallel RLC network only.

Unit 3 Two Port Networks 10

Two Port Networks: Impedance, admittance, hybrid, transmission (ABCD) parameters, conversion of one parameter to another parameter, conditions for reciprocity & symmetry, Inter connection of two port networks in series, parallel and cascaded configurations, problems (with independent dc sources only).

Unit 4 Network Theorems 10

Network Theorems: Superposition, Thevenin's, Norton's, maximum power transfer, Millman's, reciprocity theorem - problems (with independent dc sources only).

Unit 5 Transient Analysis 10

Transient Analysis: Transient Response of RL, RC & RLC Series Circuits for dc and sinusoidal excitation using differential equation approach, problems (with independent sources only).

Prescribed Textbooks:

1. A.Sudhakar and Shyammohan S Palli, “Circuits and Networks” McGraw Hill, 2018.
2. A.Chakrabarti, “Circuit Theory-Analysis and Synthesis”, Dhanpat Rai & Co, 2010.

Reference Books:

1. M.E. Van Valkenberg. “Network Analysis”. 3rd edition, Pearson Publications, New Delhi 2006.
2. William H. Hayt& Jack E. Kennedy & Steven M. Durbin. “Engineering Circuit Analysis”. 8th edition, Tata McGraw Hill Company, 2013.
3. J. A. Edminister & M. D. Nahvy. “Theory and Problems of Electric Circuits”. 4th Edition Schaums Outline series, New Delhi Tata McGraw Hill Company, 2004.
4. G. K. Mittal, Ravi Mittal. “Network Analysis”. 14th Edition, Khanna Publishers, New Delhi, 1997.
5. C. K. Alexander and M. N. O. Sadiku. “Fundamentals of Electric Circuits”. 5th Edition, Tata McGraw hill Publishing Company Limited, New Delhi, 2012.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24AEEE23T.1	3	2	1	-	-	-	-	-	-	-	-	-
24AEEE23T.2	2	3	-	2	-	-	-	-	-	-	-	-
24AEEE23T.3	3	2	-	2	-	-	-	-	-	-	-	-
24AEEE23T.4	3	2	1	-	-	-	-	-	-	-	-	-
24AEEE23T.5	2	3	-	2	-	-	-	-	-	-	-	-

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Engineering Physics Lab
Category: BS (LAB)
Semester: II Semester
Couse Code: 24APHY21L
Branch/es: CE & ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives:

1. To understand the role of Optical fiber parameters in engineering applications.
2. To recognize the significance of laser and ultrasonics by studying its characteristics and its application in finding the particle size.
3. To illustrate the semiconductor, magnetic and dielectric materials applications.
4. To identify the various sensor applications

Course Outcomes:

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

1. evaluate the basic parameters of solid materials
2. estimate the basic parameters of LASERS and optical fiber
3. estimate the physical parameters of sensors and semiconductors
4. evaluate the quantities of magnetic and dielectric materials

List of Experiments

1. Determination of wavelength of LASER light using diffraction grating
2. Determination of particle size using LASER.
3. Determination of spring constant of springs using Coupled Oscillator
4. Determination of Hall coefficient and carrier concentration of a given semiconductor by Hall effect.
5. Determination of Dielectric constant of dielectric material by bridge resonance method.
6. Determination of Magnetic field along the axis of a circular coil carrying current by stewrt-Gee;s method.
7. Determination of Rigidity modulus of material of a wire-by Torsional pendulum.
8. Determination of hysteresis loss of ferromagnetic material by tracing B-H Curve .
9. Determination of the numerical aperture and acceptance Angle of a given optical fiber.
10. Verification of laws of streched string- sonometer.
11. Determination of frequency of electrically vibrated tuning fork-Melde's experiment.
12. Determination of pressure variation using Strain Guage sensor.
13. Determination of the resistivity of semiconductor by Four probe method.
14. Determination of the energy gap of a semiconductor by using P-N Junction diode.
15. Determination of resistance with varying temperatureby using thermister.

Reference Books:

1. S. Balasubramanian, M.N. Srinivasan, A Text book of Practical Physics, S Chand Publishers, 2017

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24APHY11L/21L.1	3	3	1	1	2	-	-	-	-	-	-	3
24APHY11L/21L.2	3	3	1	1	2	-	-	-	-	-	-	3
24APHY11L/21L.3	3	3	1	1	2	-	-	-	-	-	-	3
24APHY11L/21L.4	3	3	1	1	2	-	-	-	-	-	-	3
24APHY11L/21L.5	3	3	1	1	2	-	-	-	-	-	-	3

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Engineering Mechanics Lab
Category: ESC(LAB)
Semester: II Semester
Couse Code: 24ACIV21L
Branch/es: CE & ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives:

1. Verify the Law of Parallelogram and Triangle of Forces.
2. Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.
3. Analyze the system of Pulleys and Moment of Inertia of Compound Pendulum and Flywheel

Course Outcomes:

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

1. Understand the fundamental principles of force systems and equilibrium.
2. Analyze and solve structural problems, including trusses and frictional systems.
3. Determine properties of surfaces, volumes, and moments of inertia.
4. Analyze kinematics and kinetics of rigid bodies and apply principles of dynamics.
5. Evaluate the principles of energy, momentum, and impulse in engineering problems.

List of Experiments:

1. Verification of Law of Parallelogram of Forces.
2. Verification of Law of Triangle of Forces.
3. Verification of the Law of polygon for coplanar-concurrent forces acting on a particle in equilibrium and to find the value of unknown forces considering particle to be in equilibrium using universal force table.
4. Determination of coefficient of Static and Rolling Frictions.
5. Determination of Centre of Gravity of different shaped Plane Lamina.
6. Verification of the conditions of equilibrium of a rigid body under the action of coplanar non concurrent, parallel force system with the help of a simply supported beam.
7. Study of the systems of pulleys and draw the free body diagram of the system.
8. Determine the acceleration due to gravity using a compound pendulum.
9. Determine the Moment of Inertia of the compound pendulum about an axis perpendicular to the plane of oscillation and passing through its Centre of mass.
10. Determine the Moment of Inertia of a Flywheel.
11. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24ACIV21T.1	3	3	1	3	1	1	1	1	1	1	1	1
24ACIV21T.2	3	3	1	3	3	1	1	1	1	1	1	1
24ACIV21T.3	3	1	1	3	3	1	1	1	1	1	1	1
24ACIV21T.4	3	3	1	3	1	1	1	1	1	1	1	1
24ACIV21T.5	3	3	1	3	3	1	1	1	1	1	1	1

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Fundamentals of Electronic Devices and Circuits lab
Category: ESC (LAB)
Semester: II Semester
Couse Code: 24AECE21L
Branch/es: EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives:

1. To identify the various electrical and electronic components and devices.
2. To analyze the performance of rectifier circuits in practical approach
3. To observe the characteristics of semiconductor devices.
4. To determine parameters like gain, impedances and band width of BJT and FET amplifier circuits.

Course Outcomes:

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

1. Gain the practical knowledge of Diode, BJT, JFET, MOSFET and some special electronic devices.
2. Design the amplifier circuits under given requirements.

List of the Experiments

1. Load regulation and line regulation of Zener Diode.
2. Full Wave bridge rectifier with and without filter.
3. Input and Output Characteristics of Transistor in CE Configuration.
4. Input and Output Characteristics of Transistor in CB Configuration.
5. Characteristics of photodiode and photo transistor.
6. JFET and MOSFET Characteristics.
7. Frequency response of CE Amplifier.
8. Frequency Response of CC Amplifier.
9. Frequency response of Common Source FET Amplifier.
10. SCR Characteristics.
11. UJT Characteristics.
12. Design self-bias circuit.
13. Transistor as a switch.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
224AECE21L.1	2	2	2	2	2	-	-	-	-	-	-	2
224AECE21L.2	2	2	2	2	2	-	-	-	-	-	-	2

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Electronic Devices and Circuits Lab
Category: ESC (LAB)
Semester: II Semester
Couse Code: 24AECE22L
Branch/es: ECE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives:

1. Verify the theoretical concepts practically from all the experiments.
2. Analyse the characteristics of Diodes, BJT, MOSFET, UJT.
3. Design the amplifier circuits from the given specifications.
4. Model the electronic circuits using tools such as PSPICE/Multisim.

Course Outcomes:

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

1. Understand the characteristics and applications of basic electronic devices.
2. Plot the characteristics of electronic devices.
3. Analyze various biasing circuits and electronic circuits as amplifiers.
4. Design MOSFET / BJT based amplifiers for the given specifications.
5. Simulate all circuits in PSPICE /Multisim.

LIST OF EXPERIMENTS: (Execute any 12 experiments)

Note: All the experiments shall be implemented using both Hardware and Software.

1. Verification of Volt- Ampere characteristics of a PN junction diode and find static, dynamic and reverse resistances of the diode from the graphs obtained.
2. Design a full wave rectifier for the given specifications with and without filters, and verify the given specifications experimentally. Vary the load and find ripple factor. Draw suitable graphs.
3. Verify various clipping and clamper circuits using PN junction diode and draw the suitable graphs.
4. Design a Zener diode-based voltage regulator against variations of supply and load. Verify the same from the experiment.
5. Study and draw the output and transfer characteristics of MOSFET (Enhance mode) in Common Source Configuration experimentally. Find Threshold voltage (VT), gm, & K from the graphs.
6. Study and draw the output and transfer characteristics of MOSFET (Depletion mode) or JFET in Common Source Configuration experimentally. Find IDSS, gm, & VP from the graphs.
7. Verification of the input and output characteristics of BJT in Common Emitter configuration experimentally and find required h – parameters from the graphs.
8. Study and draw the input and output characteristics of BJT in Common Base configuration experimentally and determine required h – parameters from the graphs.
9. Study and draw the Volt Ampere characteristics of UJT and determine η, IP, Iv, VP, &Vv from the experiment.
10. Design and analysis of voltage- divider bias/self-bias circuit using BJT.
11. Design and analysis of self-bias circuit using MOSFET.
12. Design a suitable circuit for switch using MOSFET/BJT.
13. Design a small signal amplifier using MOSFET (common source) for the given specifications. Draw the frequency response and find the bandwidth.
14. Design a small signal amplifier using BJT(common emitter) for the given specifications. Draw the frequency response and find the bandwidth.

Tools / Equipment Required: Software Toollike Multisim/ Pspice or Equivalent,
DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
24AECE22L.1	2	2	1	1	-	-	-	1	2	-	-	-
24AECE22L.2	3	2	1	2	-	-	-	1	3	-	-	-
24AECE22L.3	3	3	2	2	-	-	-	1	3	-	-	1
24AECE22L.4	3	3	3	2	-	-	-	1	3	-	-	1
24AECE22L.5	3	2	1	2	-	-	-	1	3	-	-	-

ANNAMACHARYA UNIVERSITY

(ESTD UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Title of the Course: Data Structures Lab
Category: ESC
Semester: II Semester
Couse Code: 24ACSE22L
Branch/es: CSE, AI&DS, AIML, CSE(ICB), CSE(AI), CSE(DS), CSE(AIML)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives: The course aims to strengthen the ability of the students to identify and apply the suitable data structure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures.

Course Outcomes:

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

1. Understand the role of linear data structures in organizing and accessing data efficiently in algorithms.
2. Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.
3. Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.
4. Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between de-queues and priority queues and apply them appropriately to solve data management challenges.
5. Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific Problems.

PART-A

WEEK 1: Linked List Implementation

Implement a singly linked list to perform all of its operations.

WEEK 2: Double Linked List Implementation

i) Implement a doubly linked list and perform all of its operations.
ii) Implement a circular linked list and perform insertion, deletion, and traversal.

WEEK 3: Stacks, Queues and De-queues

i) Implement a stack using arrays and linked lists.
ii) Implement a queue using arrays and linked lists.

WEEK 4: Stacks Applications

i) Write a program to evaluate a postfix expression using a stack.
ii) Use a stack to evaluate an infix expression and convert it to postfix.
iii) Implement a program to check for balanced parentheses using a stack.

WEEK 5: Binary Search Tree Implementation:

i) Implementing a BST operations using Linked List.

WEEK 6: Binary Search Tree Traversing:

i) Traversing of BST.

WEEK 7: Implementation of Hashing:

i) Implement a hash table with collision resolution techniques

PART-B

WEEK 1: Python Basics, Conditions and Loops

i) Write a Python Program to check if a number is a prime number.
ii) Write a python program to generate the Fibonacci sequence up to a given number of terms.

iii) Write a python program to find the largest prime factor of a given number.

WEEK 2: Python Lists, Dictionaries, and Tuples

i) Write a Python Program to manage a To-Do List.
ii) Write a Python Program to create Contact Book Using Dictionaries.
iii) Write a Python Program to demonstrate Tuples.

WEEK 3: Python Functions and Files

i) Write a Python Function for finding Prime Numbers in a range.
ii) Write a Python function to perform matrix multiplication.
iii) Write a Python Program to read and Print File Contents.
iv) Write a Python Program to write a user input to a file.
v) Write a Python Program to append a user input to a file.

WEEK 4: Single Linked List and Double Linked List Implementation

i) Implement a singly linked list to perform all of its operations.
ii) Implement a doubly linked list and perform all of its operations.

WEEK 5: Stacks, and Queues

i) Implement a stack using arrays and linked lists.
ii) Implement a queue using arrays and linked lists.

WEEK 6: Binary Search Tree Implementation:

i) Implementing a BST operations using Linked List.

WEEK 7: Binary Search Tree Traversing:

i) Traversing of BST.

Prescribed Textbooks:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, Silicon Press, 2008
3. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, Charles Dierbach

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning
23A0521L.1	3	3	3	3	-	-	-	-	-	-	3	3
23A0521L.2	3	3	3	3	-	-	-	-	-	-	-	3
23A0521L.3	3	3	3	-	-	-	-	-	-	-	-	3
23A0521L.4	3	3	3	3	-	-	-	-	-	2	-	3
23A0521L.5	3	3	3	3	2	-	-	-	-	-	-	3