



**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES
RAJAMPET**
(An Autonomous Institution)

ACADEMIC REGULATIONS (R20), COURSE STRUCTURE AND SYLLABI

For the students admitted to

B. Tech., Regular Four Year **CE/EEE/ME/ECE/CSE/AI&DS Degree Programme from the
Academic Year 2020-21**

and

B. Tech., Lateral Entry Scheme from the Academic Year 2021-22

VISION AND MISSION OF THE INSTITUTION

Vision

We impart futuristic technical education and instil high patterns of discipline through our dedicated staff who set global standards, making our students technologically superior and ethically strong, who in turn shall improve the quality of life of the human race.

Mission

Our mission is to educate students from the local and rural areas and from other states so that they become enlightened individuals, improving the living standards of their families, industry and society. We provide individual attention, world-class quality of Technical education and take care of character building.

ACADEMIC RULES AND REGULATIONS OF FOUR-YEAR B. TECH CE/EEE/ME/ECE/CSE/AI&DS REGULAR DEGREE PROGRAMME

APPLICABLE FOR THE STUDENT BATCHES ADMITTED FROM THE ACADEMIC YEAR 2020-21

APPLICABLE FOR THE STUDENTS (Lateral Entry) ADMITTED FROM THE ACADEMIC YEAR 2021-22

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1. PREAMBLE

Annamacharya Institute of Technology and Sciences (Autonomous), 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 and Jawaharlal Nehru Technological University Anantapur (JNTUA) Anantapuramu, the institute adopted AICTE and APSCHE model curriculum, with minor modifications to match the needs, expectations, and skillsets of students of the region, in both the under-graduate and post-graduate programmes offered from the academic year 2020-21.

2. APPLICATION AND 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 Institute.
- The regulations shall be applicable and come into force to the student batches admitted from the academic year 2020-21 and Lateral Entry students admitted from the academic year 2021-22
- The Institute 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 Institute, keeping the recommendations of the 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 Institute.
- These regulations shall be called R20 Regulations.

3. ELIGIBILITY FOR ADMISSION

3.1 ADMISSION INTO ENGINEERING UNDER GRADUATION PROGRAMMES (REGULAR)

The eligibility criteria for admission into engineering under graduate programmes offered at AITS shall be as prescribed by 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 Institute are classified into two categories i.e., **Category – A** and **Category – B** as per the GOs of Andhra Pradesh.

Category – A Seats

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

Category – B Seats

These seats shall be filled by the Institute as per the GOs issued by the Government of Andhra Pradesh from time to time

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 as per other admission criteria laid down in the GOs.

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 AITS are based on the **Choice Based Credit System (CBCS)** as defined by the UGC and the curriculum / course structure as suggested by the AICTE and APSCHE in its Model Curriculum.

Semester Scheme

- The B. Tech Programmes offered at AITS 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 first semester, second semester, and third semester and so on up to eighth semester.
- Each semester shall consist of **16 weeks** of academic work excluding internal examinations.
- 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 AITS 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 AITS 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

6. PROGRAMMES OFFERED BY THE INSTITUTE

The following B. Tech. programmes are offered as specializations by the Institute from 2020-2021.

SNo	Name of the Program	Programme Code
1	Civil Engineering	01
2	Electrical and Electronics Engineering	02
3	Mechanical Engineering	03
4	Electronics and Communication Engineering	04
5	Computer Sciences and Engineering	05
6	Artificial Intelligence and Data Science	22

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
	03	03
	04	04
Practical	02	01
	03	1.5
	04	02
Project Work / Internship	-	16.5

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	C
Humanities and Social Science Courses including Management Courses	
Civil Engineering	1
Electrical and Electronics Engineering	2
Mechanical Engineering	3
Electronics & Communication Engineering	4
Computer Science & Engineering	5
Artificial Intelligence and Data Science	22

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	DEPARTMENT
			CE/EEE/ME/ECE/CSE/AI&DS
Foundation	Engineering Sciences	ESC	24
	Basic Sciences	BSC	21
	Humanities & Social Sciences and Management	HSMC	10.5
Core	Professional Core	PCC	51
Project	Project (12)	PROJ	16.5
	Internship (4.5)		
Elective courses	Professional Elective	PEC	15
	Open Elective (including two MOOCs)	OEC	12
Mandatory Courses	Mandatory	MC	-
	Skill Oriented Courses	SC	10
Total Credits			160

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 (PEC-1 to PEC-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) opt for it.
- The selection of course based on the choice for students shall be on 'first come first serve' through on line and off line 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 require 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. Further students from a particular program/branch can opt for one Open Elective (OEC1) offered by their concerned department. However, one Open Electives (OEC2) is inter-disciplinary and shall be offered by other branches.

Two Open electives (OEC3 & OEC4) 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 class mentors before opting for an open elective course (MOOCs)

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) opt 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 on line and off line 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 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, Institution shall conduct an offline examination in the same format, which student already appeared in online examination, as per the MOOC syllabus.

7.1.6 Skill Oriented Courses

- There shall be 5 skill oriented course offered during 3rd to 7th semester. Among the 5 skill oriented courses, 4 courses shall focus on the basic 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, 2 theory and 2 practical hours may be allotted as per the decision of concerned BOS.

- Out of the 5 skill courses 2 shall be skill-oriented courses from the same domain and shall be completed in 2nd year. Of the remaining 3 skills course, 1 shall be necessarily be a soft skill course and the remaining 2 shall be skill advanced courses either from the same domain or job oriented skill course, which can be of inter-disciplinary nature.
- A pool of interdisciplinary job-oriented skill course 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 institute 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 institute 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

7.1.7 Mandatory Courses

- 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 offered during the Student Induction Programme with no credits.
- 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 has to 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

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 30 marks for Internal Evaluation and 70 marks for End-Examinations. The distribution is detailed in 8.1.1.
- For a Lab course, the distribution shall be 30 marks for Internal Evaluation and 70 marks End-Examinations. 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, 30 marks are allotted for Internal Evaluation. Two mid-term examinations (Theory Internal Examinations) shall be conducted for a Theory Course during a semester and they shall be evaluated for 30 marks of which 25 marks are given for Internal Examination and 5 marks for assignment.

For Lab Course, there shall be a continuous internal evaluation during the semester for 30 marks.

8.1.1 Theory Internal Examinations

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

Part B shall contain three either 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 20 marks. The questions shall be set/moderated such that the student can comfortably answer each question within the stipulated time.

Question paper pattern for Internal Examination (25 Marks) shall be as follows:

PART A: Five short answer questions - $5 \times 1 = 5$ Marks

PART B: 30 Marks (will be scaled to 20 marks)

- (i) There shall be three questions with internal Choice i.e., 'either' or 'choice'
- (ii) The student shall answer three questions

First Theory Internal examination shall be conducted as per the syllabus of I & II units. The second midterm 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.

For Example:

Marks obtained in I mid-term examination: 19

Marks obtained in II mid-term examination: 10

Final Internal Marks: $(19 \times 0.8) + (10 \times 0.2) = 17.2$

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

For Example:

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

Final Internal Marks: $(18 \times 0.8) + (0 \times 0.2) = 14.4$

Note: For some courses namely, Engineering Graphics and Engineering Graphics & Design, the distribution of internal evaluation and external evaluation marks shall be 30 and 70 respectively.

Of the 30 internal evaluation marks, day-to-day performance of the student shall be evaluated for 20 marks and Mid-term examination carries 10 marks. Day-to-day work shall be evaluated by the teacher concerned based on the exercises/submissions/assignments prepared in the class. Two midterm examinations shall be conducted in a semester for duration of 2 hours each for 10 marks with a weightage of 80% for better of the two and 20% for the other. The sum of day-to-day work and the midterm examination marks will be the final

internal evaluation for 30 marks for the subject. End examination shall be for 70 marks and is of 3 hours duration. The question paper shall be with 5 questions, one question from each unit with internal choice. All questions carry 14 marks each.

8.1.2 Assignment (Theory)

The assignment shall contain essay type questions/numerical problems etc., The assignments is given by the concerned class teacher for five marks from first two units. The second assignments shall give from rest of the syllabus. The first assignment should be submitted before the conduct of the first mid examination, and the second assignment should be submitted before the conduct of the second mid examination. There shall be at least two assignments in a semester and performance of one best out of two assignments to be considered.

8.1.3 Lab Internal Evaluation

Out of the 30 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 10 marks by the concerned teacher. Performance of one best out of two tests to be considered.

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 an 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 Evaluation

The student who has missed both the Theory Internal examinations will be permitted to appear for a Make-up Internal examination in the event of his/her producing satisfactory evidences of medical ailment. One Make-up internal test shall be conducted immediately after the II Mid-term 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 mid examinations with valid reasons he/ she should produce a supporting document to the department within a week after completion of last mid examination. And the same student absent for same subject in II mid 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.

8.2 End Evaluation

8.2.1 Theory End Evaluation

As specified in 8.0, Theory End Evaluation is done for 70 marks. End examination of theory subjects shall be conducted at the end of semester. There shall be Regular and Supplementary End Examinations. Theory End Examination shall be conducted for 70 marks and is of 3 hours duration.

Theory 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 type questions (Total 10 questions with internal choice). 60 marks allotted for Part B and each question shall carry 12 marks. There will be one question from each unit. The examination shall be conducted for 3 hours.

Question paper pattern for Semester End Examination (70 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 12 = 60 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 Examination

As specified in 8.0, Lab End Evaluation is done for 70 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 a mandatory Internship for 2 months for 1.5 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 3 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 parallelly 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 project report on the work carried out during the internship. The project report shall be evaluated with an external examiner.
- The institute 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 HOD, Project Supervisor and senior faculty member of the department and the remaining 150 marks shall be awarded by a committee consisting of HOD, project Supervisor and an External Examiner nominated by the Principal 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. 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 8.0 SGPA up to the end of 2nd semester without any backlogs. In case of the declaration of the 3rd semester results after the commencement of the 4th semester and if a student fails to score the required minimum of 8 SGPA, his/her registration for Honors 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 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 Under Graduate 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 has to be cleared separately. The concerned BoS shall explore the possibility of introducing virtual labs for such courses with lab component. (Model pool list is enclosed in the 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 mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.

- 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.

11. Curricular Framework for Minor Programme

- a) Students who are desirous of pursuing their special interest areas other than the chosen discipline of Engineering may opt for additional courses in minor specialization groups offered by a department other than their parent department. For example, if Mechanical Engineering student 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 Institute 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 4th semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 8 SGPA up to the end of 2nd semester without any history of backlogs. It is expected that the 3rd semester results may be announced after the commencement of the 4th semester. If a student fails to acquire 8 SGPA up to 3rd semester or failed in any of the courses, his/her registration

for Minors program shall stand cancelled. An SGPA of 8 has to be maintained in the subsequent semesters without any backlog in order to keep the Minors registration active.

- A student shall earn additional 20 credits in the specified area to be eligible for the award of B.Tech degree with Minor. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160 credits).
- 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. 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 pass/fail course without any grades, the grade to be assigned as decided by the Academic Council.
- Student can opt for the Industry relevant minor specialization as approved by the concerned departmental BoS. Student can opt the courses from Skill Development Corporation (APSSDC) or can opt the courses from an external agency recommended and approved by concerned BOS and should produce course completion certificate. The Board of studies of the concerned discipline of Engineering shall review such courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest skills based on industrial demand.
- A committee should be formed at the level of Institute / 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 mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following:
 - All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped 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.

12. Attendance Requirements and Detention Policy

- A student shall maintain a minimum required attendance of 50 % 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 Institute Academic Committee based on the rules prescribed by the Academic Council of the Institute 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 Institute 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 Institute 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.

13. Minimum Academic Requirements and Award of the Degree

The following Academic Requirements have to be satisfied in addition to the attendance requirements mentioned in section 10.

13.1 A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory and lab courses, and project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the total of the internal and end examination marks taken together. In case of mandatory courses, he/she shall secure 40% of the total marks.

13.2 A student admitted in 4 year B. Tech programme, shall be promoted from 4th to 5th Semester only if he/she fulfills the academic requirements of securing a minimum of 50% credits from I year I and II-Semesters, II year I and II-Semesters examinations conducted till that time. A student admitted in 3 year B. Tech programme, shall be promoted from 4th to 5th Semester only if he/she fulfills the academic requirements of securing a minimum of 50% credits from II year I and II-Semesters examinations conducted till that time.

13.3. A student admitted in 4 year B. Tech programme, shall be promoted from 6th to 7th Semester only if he/she fulfills the academic requirements of securing a minimum of 50% credits from I year I & II-Semesters, II year I & II-Semesters and III year I & II-Semesters examinations conducted till that time.

A student admitted in 3 year B. Tech programme, shall be promoted from 6th to 7th Semester only if he/she fulfills the academic requirements of securing a minimum of 50% credits from II year I & II-Semesters and III year I & II-Semesters examinations conducted till that time. And in case a student is detained for want of credits for particular academic year by sections 11.2 and 11.3 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 5th semester or 7th semester as the case may be.

13.4 A student shall register and put up minimum academic requirement of all 160 credits and earn all 160 credits for the award of B. Tech degree

13.5 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 in B.Tech. course and their admission shall stand cancelled.

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

The performances of students in each of the courses in the Programme are expressed in terms of letter grades based on an absolute grading system. We use 10-point grading system with letter grades. They are given in the following table.

Marks Obtained	Letter Grade	Description	Grade Points (GP)
≥90	A+	Outstanding	10
≥80 and ≤89.99	A	Excellent	9
≥70 and ≤79.99	B	Very Good	8
≥60 and ≤69.99	C	Good	7
≥50 and ≤59.99	D	Average	6
≥40 and ≤49.99	E	Pass	5
<40	F	Fail	--
Absent in the exam(s)	Ab	Absent	--

A student is eligible for the award of the B.Tech. Degree with the class as mentioned in the following table

CGPA	Class
≥7.5	First class with Distinction
≥6.5 and <7.5	First Class
≥5.5 and <6.5	Second Class
≥5.0 and <5.5	Pass

For mandatory courses, student shall be awarded “pass” or “fail “without any credit. This shall not be counted for the computation of SGPA/CGPA

14.1 Computation of SGPA

The performance of each student at the end of each semester shall be indicated in terms of SGPA. The SGPA shall be calculated as follows:

$$SGPA = \frac{\text{Total earned weighted grade points in a semester}}{\text{Total credits in a semester}}$$

$$SGPA = \frac{\sum_{i=1}^p C_i \cdot G_i}{\sum_{i=1}^p C_i}$$

Where

C_i = Number of credits allotted to a particular course ‘i’

G_i = Grade point corresponding to the letter grade awarded to the course i

$i = 1, 2, \dots, p$ represent the number of courses in a particular semester.

Note: SGPA is calculated and awarded to those students who pass all the courses in a semester.

14.2 Computation of CGPA

The performance of a student shall be obtained by calculating Cumulative Grade Point Average (CGPA), which is weighted average of the grade points obtained on all courses during the course of study

$$CGPA = \frac{\text{Total earned weighted grade points for the entire programme}}{\text{Total credits for the entire program}}$$

$$CGPA = \frac{\sum_{j=1}^m C_j \cdot G_j}{\sum_{j=1}^m C_j}$$

Where

C_j = Number of credits allotted to a particular semester 'j'

G_j = Grade point corresponding to the letter grade awarded to the semester j

$j = 1, 2, \dots, m$ represent the number of semester of the entire programme.

14.3 Grade Card

The grade card issued shall contain the following

- The credits for each course offered in that semester
- The letter grade and grade point awarded in each course
- The SGPA and CGPA
- Total number of credits earned by the student up to the end of that semester

Example: - Computation /calculation of SGPA

Course name	Credits (C)	Letter grade	Grade point (GP)	Credit point (CP=C*GP)
Course 1	4	A	9	4x9=36
Course 2	3	A+	10	3*10=30
Course 3	2.5	A+	10	2.5*10=25
Course 4	1.5	C	6	1.5*6=9
Course 5	1	D	5	1*5=5
Total	12			105

Therefore, SGPA = $\frac{105}{12}$ 8.75

Example Illustration of CGPA

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5
Credit: 20	Credit : 20	Credit : 22	Credit: 23	Credit : 22
SGPA : 8.75	SGPA : 8.25	SGPA : 7.89	SGPA : 8.21	SGPA : 7.86

Thus, CGPA = $\frac{20*8.75+20*8.25+22*7.89+23*8.21+22*7.86}{107} = 8.34$

Similarly, compute CGPA obtained at the end of 8th semester shall be the final CGPA secured by the student for the entire programme.

14.4 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.

$$\text{Percentage} = (\text{CGPA} - 0.50) * 10$$

14. 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.

16. Transitory Regulations

Discontinued, detained, or failed candidates are eligible for readmission 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 readmitted. 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 readmitted.

17. Readmission of Students

A student who has satisfied the minimum attendance requirement in any semester may repeat that semester, after obtaining written permission from the Principal 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 & PG student during the entire course of study

18. Minimum Instruction Days for a Semester

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

19. Student transfers

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

20. Announcement of results

- Results review committee comprising of University nominee, Principal, Dean Academics, Chairmen 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 in to Institution 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 Heads of the departments.

21. 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 Principal/ Governing body is final.
- Any legal issues are to be resolved in Rajampet Jurisdiction.
- The Institute 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 Institute.

Appendix-I: Internship Guidelines

The Head of the Department will arrange internship for students in industries/organization after fifth semester or as per AICTE/ affiliating University guidelines. Institutions 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 wishes to apply for Revaluation/Recounting of his/her answer-books(s) must submit his/her application on the prescribed form 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 on 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 institute will pay back Rs 9,000 (Nine thousands 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 Principal, Chairman
2. Dean, Academics, Member
3. Invigilator, Member
4. Subject expert, Member
5. Concerned Head of the Department, Member
6. 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
	<i>If the candidate:</i>	
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.
(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.
7.	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 practical's 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

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		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 damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of student of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/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.
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.
10.	Possess any lethal weapon or firearm in the	Expulsion from the examination hall and cancellation of the

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	examination hall.	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 college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in class 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person (s) who does not belong to the College will be handed over to police and, a police case will be registered against them.
11.	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.
12.	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.
13.	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.	

Activities (Non-Credit) as per AICTE Guidelines List of Activities

1. Physical and Health

- 1.1 Physical Activities: (a) Games and Sports, (b) Gardening (c) Tree Plantation (d) Yoga:
- 1.2 NCC/NSS: Standard procedure

2. Culture

- 2.1 Learning an art form: music, dance, theatre, painting, and other art forms
- 2.2 Heritage: Visit to museum, archaeology sites, cultural walks, tours, local traditions
- 2.3 Intangible Cultural Heritage: Festivals, Food ways, Local Games

3. Literature & Media

- 3.1 Literature, Cinema and Media: workshop, reading multiple news sources, analyse ads
- 3.2 Group reading: Group sits and each person reads aloud (if possible, with proper modulation) taking turns.
This if done properly for an hour one may complete 30-40 pages in an hour

4. Social Service

- 4.1 Social Awareness: Artisans-relates to engg., visit to hospitals, orphanages, police station, courts, trauma centres, consumer forums
- 4.2 Social Service: teach in neighbourhood, adopt an underprivileged school, village stay / visit (NSS), cleanliness drive, and skill transfer

5. Self-Development

- 5.1 Spiritual, Mindfulness & Meditation
- 5.2 Religion and Inter-faith: Reading of books on religious texts of different faiths by famous authors, organizing lecture on interfaith issues covering philosophies and chronology and contemporary situations world over at a given time
- 5.3 Human Values
- 5.4 Behavioural and Interpersonal skills: Motivational lectures, Group Discussions/activities, Case Study, Games/Stimulation Exercises, Role-Playing, Mindfulness training.
- 5.5 Lectures: Areas could be from science, engineering, social sciences, arts or even politics.

6. Nature

- 6.1 Nature Club: bird watching, recognizing plants at institute/at home, recognizing local animals, appreciating biodiversity
- 6.2 Environment Protection (non-credit course)

7. Innovation

- 7.1 Project based – Sc. Tech., Social, Design & Innovation: (a) Exposure to social problems (which are amenable to technological solutions) (b) Design & Innovation (to address above problems)

First 3-weeks – Induction Program will have Physical activities (*), Learning an art form (*), Literature & Cinema, Social Awareness (*) Lectures, Visits to local areas, Universal Human Values (*)

(*) It is the core part of Induction Program (Besides Familiarization to the College, Department and Branch career opportunities)

After first 3 weeks (1st semester)

Based on student interest – the above may be continued

Universal Human Values Groups – Meet once a week with 1st year students with the same faculty mentor & senior student guide.

Semester 2 to 4

Every student should register for some activity mentioned above in every semester. Spend 3-5 hours per week on the activity.

- 1. Environment Science (mandatory non-credit course prescribed at 1/2 semester)
- 2. Life Sciences for Engineers (mandatory non-credit course prescribed at 3/4 semester)
- 3. Constitution of India (mandatory non-credit course prescribed at 5/6 semester)
- 4. Essence of Indian Traditional Knowledge (mandatory non-credit course prescribed at 5/6 semester)

For mandatory non-credit courses, these will be graded as Pass or Fail (P/F). Thus, the grades obtained will not affect the grade point average. However, they will appear on the grade sheet.

Semester 5 to 8

Every student should register for some activity mentioned above in every semester. Spend 3-5 hours per week on the activity. For activities, suitable registration system in case of the semesters will be developed.

STUDENT INDUCTION PROGRAMME (Zero Semester)

Induction programme for newly admitted students is conducted in line with AICTE/UGC Induction programme policy, every year before the commencement of the first semester classes. The objective of the Induction programme is to demystify what is expected of students in Intermediate level and to provide adequate foundation in the core applied science subjects and English limited to moderate level so that students do not face any difficulty when the classes commence.

The syllabus for the course is framed in such a way that equal importance is given to both Engineering discipline and personality development which includes soft skills, sports and cultural Activities. The duration of the induction programme is **THREE** weeks. The students are trained in Foundation courses, basics of programming and English apart from other co-curricular and extra-curricular activities.

The objective of the Induction Programme is to work closely with the newly joined students in order to facilitate the following:

- Make the students feel comfortable in the new environment
- Allow them to explore their academic interests and activities
- Reduce competition and make them work for excellence
- Promote bonding within them
- Build relations between teachers and students
- Give a broader view of life
- Build character

Phase	Course Code	Name of the course	Lecture	Practical
Regular Phase	20A501	Proficiency classes: Familiarity with a computer	2	2
Regular Phase	20AC01	Proficiency classes: English Communication Skills	2	2
Regular Phase	20A502	Basics of Programming and Lab	3	2
Regular Phase	20AC02	Foundation classes in Mathematics	3	0
Regular Phase	20AC03	Foundation classes in Physics	3	2
Regular Phase	20AC04	Foundation classes in Chemistry	3	2
Regular Phase	20AC05	Universal Human Values I	2	0
Regular Phase	20A301	Fundamentals of Engineering Drawing	1	0
Regular Phase	-	Physical education activities – Sports and Games	0	1
Non daily	-	Creative Arts		
Non daily	-	Lectures by eminent personalities		
Non daily	-	Visits to local area		
Non daily	-	Extra-curricular activities		

Basic Structure for I.B.Tech. R 20 Regulations ELECTRICAL AND ELECTRONICS ENGINEERING

Semester I (First year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	20AC11T	Algebra and Calculus	3	0	0	3
2	BSC	20AC12T	Applied Physics	3	0	0	3
3	ESC	20A511T	Problem Solving through C programming	3	0	0	3
4	ESC	20A312T	Engineering Drawing	1	0	4	3
5	ESC	20A211T	Basic Electrical Engineering	3	0	0	3
6	ESC	20A511L	Problem Solving through C programming Lab	0	0	3	1.5
7	BSC	20AC12L	Applied Physics Lab	0	0	3	1.5
8	ESC	20A313L	Engineering & IT Workshop	0	0	3	1.5
Total credits							19.5

Category	Credits
BSC	7.5
ESC	12
Total Credits	19.5

Semester II (First year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	20AC21T	Differential equations and vector calculus	3	0	0	3
2	BSC	20AC23T	Chemistry	3	0	0	3
3	HSMC	20AC25T	Communicative English	3	0	0	3
4	ESC	20A221T	Electrical Circuits	3	0	0	3
5	ESC	20A222T	Fundamentals of Electronic Devices and Circuits	3	0	0	3
6	BSC	20AC23L	Chemistry Lab	0	0	3	1.5
7	ESC	20A222L	Fundamentals of Electronic Devices and Circuits Lab	0	0	3	1.5
8	HSMC	20AC25L	Communicative English Lab	0	0	3	1.5
9	MC	20AC26T	Environmental Sciences	3	0	0	0
Total credits							19.5

Category	Credits
BSC	7.5
HSMC	4.5
ESC	7.5
Total Credits	19.5

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Electrical and Electronics Engineering

Title of the Course Algebra and Calculus
Category BSC
Course Code 20AC11T

Year I B. Tech.
Semester I Semester
Branch Common to CE,EEE,ME,ECE,CSE and AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

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

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.

Learning Outcomes: At the end of the unit, the student will be able to:

- Find the rank, Eigen values and Eigenvectors of a matrix (L1)
- Solve systems of linear equations(L3)

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.

Learning Outcomes: At the end of the unit, the student will be able to:

- Apply Cayley-Hamilton theorem to find inverse and power of a matrix (L3)
- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics(L3)

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.

Learning Outcomes: At the end of the unit, the student will be able to:

- Translate the given function as series of Taylor's and Maclaurin's(L2)
- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies, and utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)
- Acquire the Knowledge of maxima and minima of functions of several variables (L1)

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.

Learning Outcomes: At the end of the unit, the student will be able to:

- Extend the definite integral to double and triple integrals in cartesian and polar coordinates(L2)
- Apply double integration techniques in evaluating areas bounded by region(L3)

Unit 5 Special Functions 8

Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the properties of beta and gamma functions and its relations(L2)

- Utilize the special functions in evaluating definite integrals(L3)

Prescribed Textbooks:

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

Reference Books:

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

Course Outcomes:

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

- Apply the knowledge to solve System of linear equations.
- Develop the use of matrix algebra techniques that is needed by engineers for practical applications
- Classify the functions of several variables which is useful in optimization
- Solve important tools of calculus in higher dimensions and be familiar with 2-dimensional, 3- dimensional coordinate systems
- Understand the properties of beta and gamma functions and its relations

Blooms Level of Learning

L3
L3
L4
L3
L2

CO-PO Mapping:

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
20AC11T.1	3	3	-	-	-	-	-	-	-	-	-	3	-	-
20AC11T.2	3	2	-	-	-	-	-	-	-	-	-	3	-	-
20AC11T.3	3	3	-	-	-	-	-	-	-	-	-	2	-	-
20AC11T.4	3	3	-	-	-	-	-	-	-	-	-	2	-	-
20AC11T.5	3	3	-	-	-	-	-	-	-	-	-	2	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Electrical and Electronics Engineering

Title of the Course Applied Physics
Category BSC
Course Code 19AC12T

Year I B. Tech.
Semester I Semester
Branch Common to EEE and ECE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To impart knowledge in basic concepts of wave optics, electromagnetic theory and fiber optics.
- To explain the significant concepts of dielectrics, magnetic materials, semiconductors and superconductors in the field of engineering and their potential applications.
- To familiarize the applications of nanomaterials relevant to engineering branches.

Unit 1 Wave Optics 9

Interference-Principle of Superposition-Interference of light- Conditions for sustained Interference -Interference in thin films (reflected light)-Newton's Rings-Determination of Wavelength- Engineering applications of interference.

Diffraction-Fraunhofer Diffraction-Single and double slit Diffraction -Diffraction Grating – Grating Spectrum -Determination of Wavelength-Engineering applications of diffraction.

Polarization-Polarization by double refraction-Nicol's Prism--Half wave and Quarter wave plate- Engineering applications of Polarization.

Learning Outcomes: At the end of the unit, the student will be able to:

- Explain the need of coherent sources and conditions for sustained interference and illustrate the concept of polarization of light and its applications. (L2)
- identify engineering applications of interference including homodyne and heterodyne detection. (L3)
- analyze the differences between interference and diffraction and classify ordinary and extraordinary polarized light. (L4)

Unit 2 Dielectric and Magnetic materials 11

Introduction-Dielectric Polarization-Dielectric polarizability- Susceptibility and Dielectric constant- Types of polarizations: Electronic and Ionic (quantitative), Orientation polarizations (qualitative) -Frequency dependence of polarization- Lorentz (internal) field - Claussius -Mosotti equation-Applications of Dielectrics – ferro electricity.

Introduction- Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials-Weiss domain theory of ferromagnetism (qualitative)-Hysteresis-soft and hard magnetic materials-Magnetic device applications (Magnetic bubble memory).

Learning Outcomes: At the end of the unit, the student will be able to:

- explain the concept of dielectric constant and polarization in dielectric materials. (L2)
- classify the magnetic materials based on susceptibility and their temperature dependence. (L2)
- apply the concept of magnetism and magnetic devices. (L3)

Unit 3 Electromagnetic Waves and Fiber Optics 9

Divergence and Curl of Electric and Magnetic Fields-Gauss theorem for divergence and stoke's theorem for curl-Maxwell's Equations (quantitative)- Electromagnetic wave propagation (non-conducting medium)- Poynting's Theorem.

Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation-Acceptance angle-Numerical Aperture-Classification of fibers based on Refractive index profile, modes (step index, Graded index optical fibers) – attenuation and losses in optical fibers-Block diagram of fiber optic communication- Medical Applications-Fiber optic Sensors.

Learning Outcomes: At the end of the unit, the student will be able to:

- apply the Gauss' theorem for divergence and Stoke's theorem for curl. (L3)
- apply electromagnetic wave propagation in different guided media. (L3)
- classify optical fibers based on refractive index profile and mode of propagation and identify the applications of optical fibers in medical, communication and other fields.(L2)

Unit 4 Semiconductors

8

Origin of energy bands - Classification of solids based on energy bands – Intrinsic semi conductors - density of charge carriers-Fermi energy – Electrical conductivity - extrinsic semiconductors - P-type & N-type - Density of charge carriers - Dependence of Fermi energy on carrier concentration and temperature- Direct and Indirect band gap semiconductors-Hall effect- Hall coefficient - Applications of Hall effect - Drift and Diffusion currents – Einstein's relation - Applications of Semiconductors.

Learning Outcomes: At the end of the unit, the student will be able to:

- outline the properties of n-type and p-type semiconductors and charge carriers. (I2)
- interpret the direct and indirect band gap in semiconductors. (L2)
- identify the type of semiconductor using Hall effect. (L2)

Unit 5 Superconductors and Nano materials

8

Superconductors-Properties- Meissner's effect - Types of Superconductors - BCS Theory-Josephson effect (AC & DC)- Applications of superconductors.

Nano materials – significance of nanoscale - properties of nanomaterials: physical, mechanical, magnetic, Optical, Thermal - synthesis of nanomaterials: top-down - ball milling- Bottom-up - Chemical vapor deposition- characterization of nanomaterials: X-ray diffraction (XRD)- Scanning Electron Microscope (SEM) - Applications of Nano materials.

Learning Outcomes: At the end of the unit, the student will be able to:

- explain how electrical resistivity of solids changes with temperature. (L2)
- classify superconductors based on Meissner's effect. (L2)
- Apply the basic properties of nanomaterials in various engineering branches. (L3)

Prescribed Textbooks:

1. M.N. Avadhanulu, P.G.Kshirsagar & TVS. Arun murthy "A Text book of Engineering Physics"-S.Chand Publications, 11th edition, 2019
2. K Thyagarajan "Applied Physics"-McGraw Hill Education (India) Private Ltd, 2019

Reference Books:

1. David J.Griffiths, Introduction to Electrodynamics, 4/e, Pearson Education, 2014
2. T Pradeep, A textbook of Nano Science and Nano Technology, Tata McGrawHill 2013
3. Charles Kittel, Introduction to Solid State Physics, Wiley Publications, 2011
4. Gerd Keiser, Optical Fiber Communications, 4/e, Tata McGrawHill, 2008

Course Outcomes:

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

Blooms Level of Learning

- | | |
|--|---------|
| 1. Explain the concepts of interference, diffraction and polarization and identify their applications in engineering field. | L2&L3 |
| 2. Summarize the various types of polarization of dielectrics, classification of magnetic materials and the applications of dielectric and magnetic materials. | L2 |
| 3. Apply electromagnetic wave propagation in different guided media and Explain fiber optics concepts in various fields with working principle. | L2 & L3 |
| 4. Outline the properties of various types of semiconductors and identify the behavior of semiconductors in various fields | L2 |
| 5. Explain various concepts of superconductors and nanomaterials with their applications in various engineering branches. | L2 |

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
20AC12T.1	3	2	2	-	-	-	-	-	-	-	-	-	-	-
20AC12T.2	3	2	2	-	-	-	-	-	-	-	-	2	-	-
20AC12T.3	3	2	2	-	-	-	-	-	-	-	-	2	-	-
20AC12T.4	3	1		-	-	-	-	-	-	-	-	-	-	-
20AC12T.5	3	2	2	-	-	-	-	-	-	-	-	2	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Electrical and Electronics Engineering

Title of the Course Problem Solving through C programming
Category ESC
Course Code 20A511T

Year I B.Tech.
Semester I Semester
Branch Common to CE,EEE,ME,ECE,CSE and AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

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

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 associativity.

Learning Outcomes: At the end of the unit, the student will be able to:

- Identify situations where computational methods and computers would be useful.
- Approach the programming tasks using techniques learned and write pseudo-code.
- Choose the right data representation formats based on the requirements of the problem.
- Write the program on a computer, edit, compile, debug, correct, recompile and run it.

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.

Learning Outcomes: At the end of the unit, the student will be able to

- Use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.
- Identify tasks in arrays with different techniques that are applicable and apply them to write programs.
- Design and implement operations on both single and Multidimensional arrays.

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.

Learning Outcomes: At the end of the unit, the student will be able to

- Implement and test the programs on strings using string manipulation functions.
- Analyze programming problems to choose when regular loops should be used and when recursion will produce a better program

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.

Learning Outcomes: At the end of the unit, the student will be able to:

- Identify tasks in which the dynamic memory allocation techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.

- Design and develop Computer programs, analyzes, and interprets the concept of pointers and their usage.

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.

Learning Outcomes: At the end of the unit, the student will be able to:

- Define derived data types and use them in simple data processing applications.
- Develop and test C programs for simple applications using files.

Prescribed Text Books:

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, Yeswanth Kanitkar, 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

Course Outcomes:

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

Blooms Level of Learning

- | | |
|--|----|
| 1. Formulate solutions to problems and represent those using algorithms/Flowcharts. | L3 |
| 2. Choose proper control statements and use arrays for solving problems. | L3 |
| 3. Decompose a problem into modules and use functions to implement the modules. | L4 |
| 4. Apply and use allocation of memory for pointers and solve the problems related to manipulation of text data using files and structures. | L3 |
| 5. Develop the solutions for problems using C programming Language. | L6 |

CO-PO Mapping:

SCO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20A511T.1	1	2	2	3	-	1	-	-	-	-	-	-	3	-
20A511T.2	3	3	3	3	3	-	-	-	1	-	-	-	3	-
20A511T.3	3	2	1	2	1	-	-	-	1	-	-	2	3	-
20A511T.4	2	3	2	2	3	-	-	-	1	-	1	2	3	-
20A511T.5	3	2	2	2	2	-	-	-	1	-	-	2	3	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Electrical & Engineering

Title of the Course Engineering Drawing
Category ESC
Course Code 20A312T

Year I B.Tech
Semester I Semester
Branch Common for CE, EEE & ECE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	0	2	3

Course Objectives:

- To bring awareness that Engineering Drawing is the Language of Engineers.
- To familiarize how industry communicates technical information.
- To teach the practices for accuracy and clarity in presenting the technical information.
- To develop the engineering imagination essential for successful design.
- To provide the basic geometrical information to ignite the innovative design ideas.

Unit 1 Introduction to Drawing and Engineering Curves.

Theory Hours: 05
Practice sessions: 04

Introduction: Lettering–Geometrical Constructions–Construction of polygons by General method.

Conics: Ellipse, Parabola and Hyperbola (General method only). Special Methods: Ellipse - Concentric Circles method, Oblong method & Arcs of Circles method - Drawing tangent & normal to the conics.

Cycloidal Curves: Cycloid, Epi-cycloid, Hypo-cycloid (simple problems) - Drawing tangent & normal to the Cycloidal curves.

Learning Outcomes: At the end of the unit, the student will be able to

- Understand the significance of engineering drawing and understand the geometrical constructions, conventions used in the engineering drawing.
- Identify the curves obtained in different conic sections and able to draw different conic curves.
- Know and draw the different Cycloidal curves, also its practical application in engineering.

Unit 2 Projections of Points and Lines.

Theory Hours: 03
Practice sessions: 06

Projections of points - Projections of lines inclined to one reference plane, Projections of lines inclined to both reference planes. True lengths and Traces of lines.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the principles and elements of projection.
- Know how to draw the projections of points, lines.
- Differentiate between projected length and true length and also find the true length of the lines.

Unit 3 Projections of Planes.

Theory Hours: 05
Practice sessions: 04

Projection of planes inclined to one reference plane - and inclined to both the reference planes.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the projections of different geometrical regular plane surfaces.
- Identify and Construct the true shapes of the plane surfaces.
- Analyze the projections of plane surface inclined to both the planes.

Unit 4 Projections of Solids.

Theory Hours: 04

Practice sessions: 05

Projections Of simple Solids such as Cylinder, Cone, Prism and Pyramid - Axis Inclined to one reference plane, Axis inclined to both the reference planes.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand different types of solids.
- Draw projection of simple solids.
- Draw the Projections of solids inclined to both the reference planes.

Unit 5 Isometric Projections & Conversion of Views.

Theory Hours: 04

Practice sessions: 05

Isometric Projections: Projections of Lines, Planes and Simple Solids – Prism, Pyramid, Cylinder and Cone in simple positions only.

Conversion of Views: Conversions of Orthographic views in to Isometric views and Conversion of Isometric views to Orthographic views.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the pictorial views such as isometric views, orthographic views and also differentiate between Isometric Projection and View.
- Draw the Isometric views of simple plane surfaces and simple solids.
- Draw the conversions of Isometric Views in to Orthographic Views and Vice-versa.

Prescribed Text Books:

1. Engineering Drawing, N.D. Bhatt, Charotar Publishers, Edition2016
2. Engineering Drawing, K.L. Narayana, P. Kanniah, Scitech Pub, Edi2016

Reference Books:

1. Engineering Drawing and Graphics, Venugopal/ New age, Ed2015.
2. Engineering Drawing, Johle, Tata McGraw-Hill. Ed2014
3. Engineering Drawing, Shah and Rana, 2/e, Pearson Education Ed2015

Course Outcomes:

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

1. Understand the concepts of Conic Sections.
2. Understand the concept of Cycloidal Curves, Involutess and the application of industry standards.
3. Understand the Orthographic Projections of Points and Lines and are capable to improve their visualization skills, so that they can apply these skills in developing the new products.
4. Understand and apply Orthographic Projections of Planes.
5. Understand and analyze the Orthographic Projections of Solids and conversion of isometric views to orthographic views viceversa.

Blooms Level of Learning

L1, L2

L2, L3

L2, L3

L1, L2, L3

L3, L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
20A312T.1	3	-	-	-	-	3	2	-	1	2	-	-	-	-
20A312T.2	3	-	-	-	-	3	2	-	1	2	-	-	-	-
20A312T.3	3	2	-	-	-	3	2	-	1	2	-	-	-	-
20A312T.4	3	2	-	-	-	3	2	-	1	2	-	-	-	-
20A312T.5	3	-	2	-	2	2	-	3	3	-	-	3	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Electrical and Electronics Engineering

Title of the Course Basic Electrical Engineering
Category ESC
Course Code 20A211T

Year I B.Tech
Semester I Semester
Branch EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- understand the fundamental laws and circuit elements
- analyze the DC circuits.
- know the various measuring instruments and electrical installations
- understand the conventional power generation methods
- understand the solar and wind power generation methods

Unit 1 Fundamental Laws and Circuit Elements 9

Voltage, current, power, energy, charge, flux, emf, static and dynamic emf, classification of magnets: permanent magnets and electro magnets, magnetic leakage, magnetic hysteresis, B-H curve, residual magnetism, 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.

Electrical circuit elements (R, L and C), Ohm's law, v-i relationships, classification of elements, voltage and current sources.

Learning Outcomes: At the end of the unit, the student will be able to:

- understand the fundamental laws of Electrical Engineering.
- know the electrical circuit elements and their v-i relationships.
- know the electrical sources.

Unit 2 Analysis of DC Circuits 9

Network reduction techniques - series, parallel, star-delta transformation, Kirchhoff's current and voltage law, voltage division, current division, source transformation, analysis of simple circuits with dc excitation (Independent sources only).

Learning Outcomes: At the end of the unit, the student will be able to:

- understand the network reduction techniques
- understand the Kirchhoff's laws
- solve the electrical circuits with dc excitation

Unit 3 Measuring Instruments and Electrical Installations 9

Introduction, Electrical and Electronic Instruments, Classification of Instruments, Multimeter, Function generator, Oscilloscope - Frequency Measurement, Phase Measurement.

Switch Fuse Unit (SFU), MCB, types of wires and cables, earthing, elementary calculations for energy consumption.

Learning Outcomes: At the end of the unit, the student will be able to:

- know the types of measuring instruments.
- understand the construction and operation of measuring instruments.
- know the various electrical installations

Unit 4 Conventional Power Generation 9

Evolution of Power System and Present-Day Scenario. Structure of a power system, Thermal power station- layout and working principle, hydro power station, layout and working principle, Nuclear power station layout and working principle Nuclear Fission and Chain Reaction- Nuclear Fuels- Principle of Operation of Nuclear Reactor.

Learning Outcomes: At the end of the unit, the student will be able to:

- know the evolution of power system and present-day scenario
- understand the conventional power generation methods.

Solar power generation - principle of solar Radiation, PV Cell, v-i characteristics. wind power Generation - construction of typical wind turbine - horizontal and vertical axis wind turbines.

Learning Outcomes :At the end of the unit, the student will be able to

- understand the electrical power generation using solar and wind power

Prescribed Text Books/ References:

1. D.P.Kothari and I.J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
2. D.C.Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
3. P.S.Dhokal, “Basic Electrical Engineering with Numerical Problems” McGraw Hill
4. S.Salivahanan, N,Suresh Kumar, “Electronic Devices and Circuits” McGraw Hill, 2011.
5. A.Sudhakar and Shyammohan S Palli, “Circuits and Networks” McGraw Hill, 2018.
6. C.L Wadhwa, “ Electric Power Generation,Distribution and Utilization”, New Age Inter. (P) Ltd., 2005.
7. G.D. Raj, “ Non Conventional Energy Sources”, Khanna Publishers, 2000.

Course Outcomes:

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

Blooms Level of Learning

- | | |
|--|----------|
| 1. understand the fundamental laws and circuit elements | L2
L4 |
| 2. analyze the DC circuits. | |
| 3. know the various measuring instruments and electrical installations | L2 |
| 4. understand the conventional power generation methods | L2 |
| 5. understand the solar and wind power generation methods | L2 |

CO-PO Mapping:

SCO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20A211T.1	1	1	-	-	-	-	-	-	-	-	-	-	1	-
20A211T.2	1	1	-	-	-	-	-	-	-	-	-	-	1	-
20A211T.3	-	-	1	-	-	1	-	-	-	-	-	-	-	-
20A211T.4	-	-	-	-	-	-	1	-	-	-	-	-	-	1
20A211T.5	-	-	-	-	-	-	1	-	-	-	-	-	-	1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Electrical and Electronics Engineering

Title of the Course Problem Solving through C Programming Lab
Category ESC
Course Code 20A511L

Year I B.Tech
Semester I Semester
Branch Common to CE, EEE, ME, ECE,CSE and AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

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

Minimum number of FOUR programs from each exercise are to be done students

Data Types, constants, Input and Output and expressions

Exercise 1: (week-1):Data types, Variables, Constants and Input and Output.

Exercise 2: (week-2): Operators, Expressions and Type Conversions.

Learning Outcomes: At the end of the unit, the student will be able to:

- Identify situations where computational methods and computers would be useful.
- Approach the programming tasks using techniques learned and write pseudo-code.
- Write the program on a computer, edit, compile, debug, correct, recompile and run it.

Decision control statements and Arrays

Exercise 3:(week-3):Conditional Statements[two way and multipath].

Exercise 4:(week-4):Loop Control Statements.[for, while and do-While]

Exercise 5:(week-5):Unconditioned JUMP Statements-break, continue, go to.

Exercise 6:(week-6):Declaring Arrays,Referencing Arrays,Array Subscripts.Using for loop for sequential Access.

Exercise 7:(week-7):Multidimensional Arrays

Learning Outcomes: At the end of the unit, the student will be able to:

- Choose the right data representation formats based on the requirements of the problem.
- Use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.
- Identify tasks in arrays with different techniques that are applicable and apply them to write programs.
- Design and implement operations on both single and Multidimensional arrays.

Strings and Functions

Exercise 8:(week-8):String Basics, String Library Functions and Array of Strings.

Exercise 9:(week-9):Simple user defined functions,Parameter passing methods-pass by value,pass by reference.

Exercise 10:(week-10):Storage classes-Auto, Register, Static and Extern

Exercise 11:(week-11):Recursive Functions, Preprocessor commands.

Exercise 12:(week-12):Array Elements as Function Arguments.

Learning Outcomes: At the end of the unit, the student will be able to:

- Implement and test the programs on strings using string manipulation functions.
- Analyze programming problems to choose when regular loops should be used and when recursion will produce a better program

Pointers

Exercise13:(week-13): Pointers, Dynamic memory allocation and error handling

Learning Outcomes: At the end of the unit, the student will be able to:

- Design and develop Computer programs, analyzes, and interprets the concept of pointers and their usage.
- Identify tasks in which the dynamic memory allocation techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.

Structures and Files

Exercise14:(week-14):Structures

Exercise15:(week-15): File handling

Learning Outcomes: At the end of the unit, the student will be able to:

- Define structure data types and use them in simple data processing applications.
- Develop and test C programs for simple applications using files.

Prescribed Text Books:

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, Yeswanth Kanitkar, Ninth Edition, BPB Publication
2. A K Sharma “Computer Fundamentals and Programming”, 2nd Edition, University Press, 2018.
3. Pradeep Dey and Manas Ghosh, “Programming in C”, Oxford Press, 2nd Edition, 2017
4. Reema Tharaja “Introduction to C Programming”, Second Edition, OXFORD Press, 2015
5. <https://www.cprogramming.com/>
6. <https://www.mycplus.com/tutorials/c-programming-tutorials>

Course Outcomes:

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

Blooms Level of Learning

- | | |
|---|----|
| 1. Identify and set up program development environment | L2 |
| 2. Implement the algorithms using C programming language constructs | L3 |
| 3. Identify and rectify the syntax errors and debug program for semantic errors | L3 |
| 4. Solve problems in a modular approach using functions | L4 |
| 5. Implement file operations with simple text data | L4 |

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
20A511L.1	3	2	-	2	2	-	-	-	2	2	1	-	3	-
20A511L.2	2	2	-	-	-	-	-	-	1	-	-	-	3	-
20A511L.3	3	3	3	3	-	-	-	-	1	-	-	3	3	-
20A511L.4	3	3	3	3	-	-	-	-	-	-	-	3	3	-
20A511L.5	3	3	3	3	-	-	-	-	-	-	-	3	3	-

ANNAMACHRYA INSTITUTE OF TECHNOLOGY AND SCIENCES
(An Autonomous Institution)
Department of Electrical and Electronics Engineering

Title of the Course Applied Physics Lab
Category BSC
Course Code 20AC12L
 I B.Tech
Year
Semester I Semester
Branch Common EEE & ECE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

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

List of Experiments

1. Determine the thickness of the wire using wedge shape method
2. Determination of the radius of curvature of the lens by Newton's ring method
3. Determination of wavelength by plane diffraction grating method
4. Dispersive power of a diffraction grating
5. Resolving power of a grating
6. Determination of dielectric constant by charging and discharging method.
7. Magnetic field along the axis of a circular coil carrying current.
8. Determination of the self inductance of the coil (L) using Anderson's bridge.
9. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)
10. Determination of the numerical aperture of a given optical fiber and hence to find its
11. Measurement of magnetic susceptibility by Gouy's method
12. Determination of Hall voltage and Hall coefficient 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
15. Measurement of resistance with varying temperature.

References:

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

Course Outcomes:

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

1. Operate various optical instruments and estimate various optical parameters.
2. Estimate the various magnetic properties.
3. Measure properties of semiconductors.
4. Determine the properties of dielectric materials and optical fiber materials.

Blooms Level of Learning

L2
L4
L4 & L5
L5

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Mechanical Engineering

Title of the Course Engineering & IT Workshop
Category ESC
Course Code 20A313L
Year I B. Tech
Semester I Semester
Branch EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To read and interpret job drawing, plan various operations and make assembly.
- To identify and select the hand tools and instruments used in various trades.
- To gain practical skills by performing the experiments in different trades of workshop.
- Demonstrate the parts of a personal computer system
- Demonstrate the Installation the operating system and other software required in a personal computer system
- Introduce connecting the PC on to the internet from home and workplace and effectively usage of the internet, Usage of web browsers, email, news groups and discussion forums
- Introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations
- To utilize MS Office tools

Engineering Workshop:

Trade 1 Carpentry Shop 02

Two joints (exercises) from : Mortise and tenon T joint, Dove tail joint, Bridle T joint, middle lap T joint, Half Lap joint, cross lap joint, Corner Dovetail joint or Bridle Joint from soft wood stock.

Learning Outcomes: At the end of the unit, the student will be able to apply wood working skills in real world applications.

Trade 2 Sheet metal shop 02

Two jobs (exercises) from: Tapered Tray, cylinder, conical funnel from out of 22 or 20 gauge G.I. sheet

Learning Outcomes: At the end of the unit, the student will be able to build different parts with metal sheets used in various appliances

Trade 3 Fitting shop 02

Two jobs (exercises) from: square Fit, V-Fit, Semi-circular fit, dove tail fit from M.S. stock

Learning Outcomes: At the end of the unit, the student will be able to apply fitting operations in various assemblies.

Trade 4 House-wiring 02

Two jobs (exercises) from: Parallel and Series, Two way switch, Tube –Light connection, Stair case connection.

Learning Outcomes: At the end of the unit, the student will be able to apply basic electrical engineering knowledge for house wiring practice.

Trade 5 Demonstration (Learning Hours)

Any one trade of Plumbing • Machine Shop • Metal Cutting • Soldering and Brazing

Learning Outcomes: At the end of the unit, the student will be able to get the basic awareness of any of trade demonstrated.

Prescribed Text Books:

1. Kannaiah P. and Narayana K.L., Workshop Manual, 3rd Edn, Scitech publishers.
2. John K.C., Mechanical Workshop Practice. 2nd Edn. PHI 2010.

Reference Books:

1. Jeyapoovan T.and Pranitha S., Engineering Practices Lab Manual, 3rd Edn. Vikas Pub.2008.

IT Workshop:**Task 1**

02

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

Learning Outcomes: At the end of the unit, the student will be able to:

- Identify the parts of a computer
- Know the usage of internal parts of a computer

Task 2

02

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

Learning Outcomes: At the end of the unit, the student will be able to:

- Install another operating systems
- Know how to install software's

Task 3

02

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 account and send email. They should get acquaintance with applications like Face book, 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, and search process using different natural languages, and creating e-mail account.

Learning Outcomes: At the end of the unit, the student will be able to:

- Create e-mail account and send email
- Browse internet for required information

Task 4

02

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. .

Learning Outcomes: At the end of the unit, the student will be able to:

- Prepare project documents, user manuals
- Get the knowledge on word processor tool

Task 5

02

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.

Learning Outcomes: At the end of the unit, the student will be able to:

- Create , open and save spread sheets
- Apply formulas for different tasks

Task 6

02

Presentations: creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colours, 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.

Learning Outcomes: At the end of the unit, the student will be able to:

- Create , open and save slides
- Create their own presentations for seminars

Prescribed Text Books:

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 Dream tech.
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, Ciprian Rusen, Microsoft Press
3. Troubleshooting, Maintaining & Repairing PCs, 5th Edition, Bigelow, TMH
4. Introduction to computers, Peter Norton, 6/e, Mc Graw Hill

Course Outcomes:

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

- | | Blooms Level of Learning |
|---|--------------------------|
| 1. Apply wood working skills in real world applications. | L3 |
| 2. Build different parts with metal sheets used in various appliances. | L3 |
| 3. Employ fitting operations in various assemblies. | L3 |
| 4. Execute basic electrical engineering knowledge for house wiring practice. | L3 |
| 5. Identify various operations and its applications from the demonstration. | L3 |
| 6. Recognize the peripherals of a computer, perform assembling and disassembling of various components of a computer. | L1, L3 |
| 7. Describe and perform installation and un-installation of Windows and Linux operating systems and also perform troubleshooting of various hardware and software components. | L2, L3 |
| 8. Use Web browsers to access Internet, Search Engines. | L3 |
| 9. Use word processor; spread sheet, presentation and data storage tools. | L3 |

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20A313L.1	3	-	1	-	1	-	-	-	-	-	-	1	-	-
20A313L.2	3	-	1	-	1	-	-	-	-	-	-	1	-	-
20A313L.3	3	-	1	-	1	-	-	-	-	-	-	1	-	-
20A313L.4	2	-	1	-	1	-	-	-	-	-	-	1	-	-
20A313L.5	3	-	1	-	1	-	-	-	-	-	-	1	-	-
20A313L.6	3	3	1	-	3	-	-	-	-	-	-	3	2	-
20A313L.7	3	3	1	-	3	-	-	-	-	-	-	3	2	-
20A313L.8	3	3	1	-	3	-	-	-	-	-	-	3	2	-
20A313L.9	3	3	1	-	3	-	-	-	-	-	-	3	2	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Electrical and Electronics Engineering

Title of the Course Differential Equations and Vector Calculus
Category BSC
Course Code 20AC21T

Year I B. Tech
Semester II Semester
Branch Common to CE, EEE, ME, ECE, CSE & AIDS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

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

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

Definitions-complete 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.

Learning Outcomes: At the end of the unit, the student will be able to

- Identify the essential characteristics of linear differential equations with constant coefficients(L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)

Unit 2 Equations reducible to Linear Differential Equations 8

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications: Electrical Circuits – L-C and L-C-R Circuit problems.\

Learning Outcomes: At the end of the unit, the student will be able to

- Classify and interpret the solutions of linear differential equations(L4)
- Generalize and solve the higher order differential equation by analyzing physical situations(L3)

Unit 3 Partial Differential Equations 8

Formation of PDEs by eliminating arbitrary constants and arbitrary functions, solutions of first order linear and non-linear PDEs using Charpit's method, solutions of boundary value problems by using method of separation of variables.

Learning Outcomes: At the end of the unit, the student will be able to

- Apply the techniques to find solutions of standard PDEs (L3)
- Solve the boundary value problems (L3)

Unit 4 Vector Differentiation 8

Scalar and vector point functions, vector operator Del, Del applied to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl- del applied twice to scalar point function, vector identities.

Learning Outcomes: At the end of the unit, the student will be able to

- Apply del to Scalar and vector point functions(L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl(L2)

Unit 5 Vector integration 10

Line integral-circulation-work done, surface integral, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Learning Outcomes: At the end of the unit, the student will be able to

- Find the work done in moving a particle along the path over a force field(L1)
- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals(L3)

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 NishuGupta, Engineering Mathematics Volumes-I &II, PearsonEducation
4. H. K. Das, Er. Rajnish Verma, Higher Engineering Mathematics, S.Chand.

Course Outcomes:

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

Blooms Level of Learning

1. Solve the differential equations related to various engineering fields
2. Generalize and solve the higher order differential equation by analyzing physical situations
3. Identify solution methods for partial differential equations that model physical processes
4. Understand the physical meaning of different operators such as gradient, curl and divergence
5. Find the work done against a field, circulation and flux using vector calculus

L3
L3
L3
L2
L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20AC21T.1	3	3	-	-	-	-	-	-	-	-	-	2	-	-
20AC21T.2	3	3	-	-	-	-	-	-	-	-	-	2	-	-
20AC21T. 3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
20AC21T.4	3	3	-	-	-	-	-	-	-	-	-	2	-	-
20AC21T.5	3	3	-	-	-	-	-	-	-	-	-	3	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Humanities and Sciences

Title of the Course Chemistry
Category BSC
Course Code 20AC23T

Year I Year
Semester II Semester
Branch Common to EEE & ECE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To instruct electrode potential and differentiation of different electrodes and their applications.
- To impart knowledge on the basic concepts of battery technology.
- To explain how to synthesize different polymers and differentiate polymers based on properties.
- To introduce different types of instrumental techniques and molecular machines and molecular switches.

Unit 1 Electrochemical Energy Systems - I **10**

Introduction-Origin of electrode potential, Electrode Potentials, Measurement of Electrode Potentials, Nernst Equation for a single electrode, EMF of a cell, Types of Electrodes or Half Cells-Hydrogen and Calomel electrode, Electrochemical Cell, Galvanic Cell vs. Electrolytic Cell, Electrochemical conventions, Types of Ion Selective Electrodes- glass membrane electrode, polymer membrane electrodes, solid state electrodes, gas sensing electrodes (classification only)

Learning Outcomes: At the end of the unit, the student will be able to:

- explain the construction of different Ion selective electrodes (L4)
- solve problems based on cell potential and EMF(L3)
- apply Nernst equation for calculating electrode and cell potentials (L3)

Unit 2 Electrochemical Energy Systems - II **10**

Basic concepts of batteries, battery characteristics, classification of batteries, Important applications of batteries, Classical batteries-dry/Leclanche cell, Modern batteries-zinc air, lithium cells-Li MnO₂ cell- challenges of battery technology. Fuel cells - Introduction - classification of fuel cells – Hydrogen and Oxygen fuel cell, propane and oxygen fuel cell - Merits of fuel cells.

Learning Outcomes: At the end of the unit, the student will be able to:

- explain the theory of construction of battery and fuel cells (L4)
- describe the working principle of Fuel cells (L2)
- summarize the applications of batteries (L4)

Unit 3 Polymer Chemistry **10**

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereo specific polymerization) with specific examples and mechanisms of polymer formation.

Plastics - Thermoplastics and Thermo settings, Preparation, properties and applications of Bakelite, urea-formaldehyde, Nylon-6, 6.

Elastomers Preparation, properties, and applications of Buna-S, Buna-N. Conducting polymers – polyacetylene, polyaniline – mechanism of conduction and applications

Learning Outcomes: At the end of the unit, the student will be able to:

- explain the preparation, properties and applications of Bakelite, and Nylon-6,6 (L4)
- illustrate the mechanism of conduction in polyacetylene and polyaniline (L3)
- discuss Buna-S and Buna-N elastomers and their applications (L2)

Unit 4 Instrumental Methods and their Applications **9**

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law.

Principle and applications of pH metry, Potentiometry, Conductometry, UV-Visible, IR Spectroscopy, Gas Chromatography (GC) Thin layer chromatography(TLC)

Learning Outcomes: At the end of the unit, the student will be able to:

- distinguish the ranges of different types of spectral series in electromagnetic spectrum (L4)
- understand the principles of different analytical instruments (L2)
- differentiate between pH metry, potentiometry and conductometry (L4)

Unit 5 Molecular Machines & Switches

Molecular machines: Rotaxanes and Catenanes as artificial molecular machines, prototypes – linear motions in rotaxanes, an acid-base controlled molecular shuttle, a molecular elevator, an autonomous light-powered molecular motor, systems based on Catenanes.

Molecular switches – Introduction to molecular switches, Cyclodextrin-based switches, in and out switching, back and forth switching, displacement switching

Learning Outcomes: At the end of the unit, the student will be able to:

- describe the mechanism involved in linear motion of Rotaxanes (L2)
- explain different types of switching in Cyclodextrins (L4)
- demonstrate the applications of Rotaxanes and Catenanes as artificial molecular machines (L2)

Prescribed Textbooks:

1. O.G.Palanna, Engineering Chemistry, 2/e, Tata McGraw Hill Education Private Limited, 2017.
2. P.C. Jain and M. Jain, Engineering Chemistry, 17/e, Dhanapat Rai & Sons, 2018

Reference Books:

1. Shashi Chawla, A textbook of Engineering chemistry, 3/e, Dhanapat Rai & Co, 2015.
2. Skoog, Holler, Crouch, Principles of Instrumental Analysis, 7/e, Cengage learning, 2018.
3. T. Ross Kelly, Molecular Machines, 1/e, Springer Berlin Heidelberg, 2005
4. Ben L. Feringa, Wesley R. Browne, Molecular Switches, 2/e, Wiley, 2011

Course Outcomes:

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

- | | |
|---|--------------------------------|
| 1. explain the significance of electrode potentials, classify ion selective electrodes, and list different types of electrodes | Blooms Level of Learning
L4 |
| 2. compare various batteries, explain the concepts involved in the construction of lithium cells, different fuel cells and apply redox principles for construction of batteries and fuel cells. | L4 |
| 3. illustrate the mechanism of conduction in conducting polymers, and explain the preparation, properties, and applications of various polymers | L3 |
| 4. differentiate various analytical techniques | L4 |
| 5. compare molecular switches and molecular machines, and distinguish between molecular machines | L4 |

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
20AC23T .1	3	2	-	-	-	-	-	-	-	-	-	2	-	-
20AC23T .2	3	2	-	-	-	-	-	-	-	-	-	2	-	-
20AC23T .3	3	2	-	-	-	-	-	-	-	-	-	2	-	-
20AC23T .4	3	2	-	-	-	-	-	-	-	-	-	2	-	-
20AC23T .5	3	2	-	-	-	-	-	-	-	-	-	2	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET

(An Autonomous Institution)

Department of Electrical and Electronics Engineering

Title of the Course Communicative English
Category HSMC
Course Code 20AC25T

Year I Year
Semester II Semester
Branch Common to ECE, EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- To focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- To Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- To impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays
- To provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Unit 1

9

Listening: Identifying the topic, the context, and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies, and interests; introducing oneself and others.

Reading: *On the Conduct of Life* by William Hazlitt; Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Grammar and Vocabulary: Parts of Speech, Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Learning Outcomes

At the end of this unit, the student will be able to

- understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
- ask and answer general questions on familiar topics and introduce oneself/others
- employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- form sentences using proper grammatical structures and correct word forms

Unit 2

9

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics followed by short, structured talks.

Reading: *The Brook by Alfred Tennyson*; Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Grammar and Vocabulary: Cohesive devices - linkers, signposts and transition signals; use of articles and zero article; prepositions.

Learning Outcomes

At the end of this unit, the student will be able to

- comprehend short talks on general topics
- participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
- understand the use of cohesive devices for better reading comprehension
- write well-structured paragraphs on specific topics
- identify basic errors of grammar/ usage and make necessary corrections in short texts

Unit 3

9

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed

Reading: *The Death Trap by Saki*; Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

Writing: Summarizing, Paragraph Writing, identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions

Grammar and Vocabulary: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Learning Outcomes

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

- comprehend short talks and summarize the content with clarity and precision
- participate in informal discussions and report what is discussed
- infer meanings of unfamiliar words using contextual clues
- write summaries based on global comprehension of reading/listening texts
- use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

Unit 4

9

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

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

Writing: Writing structured essays on specific topics using suitable claims and evidence.

Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; Voice - Active & Passive Voice

Learning Outcomes

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

- infer and predict about content of spoken discourse
- understand verbal and non-verbal features of communication and hold formal/informal conversations
- interpret graphic elements used in academic texts
- produce a coherent paragraph interpreting a figure/graph/chart/table
- use language appropriate for description and interpretation of graphical elements

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides.

Reading: *The Dancer with a White Parasol* by Ranjana Deve; Reading for comprehension.

Writing: Letter Writing: Official Letters/Report Writing

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

Learning Outcomes

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

- take notes while listening to a talk/lecture and make use of them to answer questions
- make formal oral presentations using effective strategies
- comprehend, discuss and respond to academic texts orally and in writing
- produce a well-organized essay with adequate support and detail
- edit short texts by correcting common errors

Prescribed Textbook:

1. Language and Life published by Orient Black Swan (with CD).

Reference Books

1. English Grammar in Use: A Self Study Reference and Practice Book, Raymond Murphy, Fourth Edition, Cambridge Publications
2. English Grammar and Composition, David Grene, Mc Millan India Ltd
3. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
4. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
5. Raymond Murphy's English Grammar in Use Fourth Edition (2012) E-book
6. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
7. Oxford Learners Dictionary, 12th Edition, 2011
8. Norman Lewis Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary (2014)
9. Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words by David Butler

Course Outcomes:

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

- | | Blooms Level of Learning |
|--|--------------------------|
| 1. understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English | L3 |
| 2. read, scan and skim texts such as literary forms, journalistic articles and scientific readings for comprehension and retention | L2 |
| 3. exhibit self-confidence and speak in formal and informal contexts | L3 |
| 4. apply grammatical knowledge in speech and writing and formulate sentences with accuracy | L2 |
| 5. produce coherent and unified paragraphs with adequate support and detail | L4 |

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
20AC25T.1	-	-	-	-	-	-	-	-	-	3	-	2	-	-
20AC25T.2	-	-	-	-	-	-	-	-	-	3	-	2	-	-
20AC25T.3	-	-	-	-	-	-	-	-	-	3	-	2	-	-
20AC25T.4	-	-	-	-	-	-	-	-	-	3	-	2	-	-
20AC25T.5	-	-	-	-	-	-	-	-	-	3	-	2	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET

(An Autonomous Institution)

Department of Electrical and Electronics Engineering

Title of the Course Electrical Circuits
Category ESC
Course Code 20A221T

Year I B.Tech
Semester II Semester
Branch EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To learn a number of powerful engineering circuit analysis techniques such as nodal analysis, mesh analysis and graphical solution to electrical network
- To learn the concepts of reactance and impedance to analyse simple a.c. circuits and methods to calculate power and power factor
- To Comprehend three phase systems with balanced and unbalanced loads and power measurements
- To Solve different complex circuits Network theorems.
- To understand frequency response in electrical circuits and clear understanding of the important parameters of a magnetic circuit.

Unit 1 Network Analysis: (9)

Mesh, Super Mesh, Nodal and Super Node analysis-Basic Definitions of Network Topology– Graph – Tree, Basic Cutset and Basic Tieset Matrices for Planar Networks –Problems, Network equilibrium equations using topology. Duality & Dual Networks-Problems.

Learning Outcomes:At the end of the unit, the student will be able to:

- Develop the basic concepts of network analysis, which is the pre-requisite for all the electrical engineering subjects
- Use network techniques like node analysis and loop analysis to write equations for large linear circuits
- Analyze circuits using graph theory.

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

Learning Outcomes: At the end of the unit, the student will be able to

- Understand and use the concepts of reactance and impedance to analyse simple a.c. circuits
- Calculate the power dissipation of an a.c. circuit, and understand the concept of power factor.

Unit 3 Three phase circuits: (9)

Advantages of Three phase AC supply-Phase Sequence - Star and Delta Connections-Relation between line, phase voltages and currents in balanced Systems - Analysis of balanced three Phase Circuits - Measurement of active and reactive power in balanced and unbalanced three phase systems - Analysis of three phase unbalanced circuits - Two wattmeter method of measurement of three phase power.

Learning Outcomes: At the end of the unit, the student will be able to

- Understand 3-phase ac circuits for designing and analysis of power system networks.

Unit 4 Network Theorems (9)
Superposition, Thevenin's, Norton's, Maximum Power Transfer, Millman's, Reciprocity, Substitution, Compensation and Tellegen's Theorems for DC and AC excitations

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand network theorems to simplify the complex networks.

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

Learning Outcomes: At the end of the unit, the student will be able to:

- Explain the effect of resonance, and its implications for practical circuits
- Design resonant circuits which are used in wireless transmission and communication networks

Prescribed Text Books:

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.

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. Acquire knowledge about single phase ac circuits
3. Acquire knowledge about three phase ac circuits
4. Analyze the circuit using Network simplification theorems.
5. Analyze series, parallel resonant circuits and magnetic circuits.

Blooms Level of Learning

L3

L2

L2

L4

L4

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Electrical and Electronics Engineering

Title of the Course **Fundamentals of Electronic Devices and Circuits**
Category **ES**
Course Code **20A222T**

Year **I B.Tech**
Semester **II Semester**
Branch **EEE**

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- Understand the operation of Diode and its applications.
- Understand the BJT operation and its biasing concepts.
- Analyze the small signal model of BJT.
- Understand the operation of FET and its biasing.
- Know the special purpose electronic devices in various applications.

Unit 1 Diodes and Applications

PN-junction diode, characteristics, applications - half wave, full wave and bridge rectifier, clippers, clampers, Zener diode, characteristics, applications - voltage regulator.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand operating characteristics of PN junction diode and Zener diode
- Know the applications of PN junction diode and Zener diode

Unit 2 Transistor and Biasing

BJT construction and operation, configurations – DC load line analysis – operating point- Bias Stability Need for Stabilization – Stabilization Factors (s, s^1, s^{11}) – Types of Biasing-Fixed Bias, Collector to Base bias, Emitter-Stabilized bias, Voltage Divider Bias.

Learning Outcomes: At the end of the unit, the student will be able to:

- understand the concepts of stability and biasing of BJT
- find the stability factor of different biasing techniques of BJT

Unit 3 Single Stage Amplifiers

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.

Learning Outcomes: At the end of the unit, the student will be able to:

- understand single stage transistor amplifier and its operation.
- understand the concepts of h-parameters

Unit 4 Field Effect Transistors & Its Biasing

Construction of JFETs – Characteristics – FET Biasing: Fixed Bias Configuration–Self Bias Configuration–Voltage Divider Biasing–Construction and Characteristics of MOSFETs–Depletion type MOSFETs–Enhancement type MOSFET

Learning Outcomes: At the end of the unit, the student will be able to:

- understand the characteristics of JFET and MOSFET
- understand the biasing circuits of JFET and MOSFET

Unit 5 Special Purpose Electronic Devices

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

Learning Outcomes: At the end of the unit, the student will be able to

- understand the construction and operation of different special purpose devices
- identify different symbols of special purpose electronic devices.

Prescribed Text Books:

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 Publications 2004
3. Integrated Electronics, Analog and Digital Circuits and Systems, J. Millman and Halkias, TMH.
4. Micro Electronic Circuits, Sedra and Smith, Oxford University Press

Course Outcomes:

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

1. Understand the operation of Diode and its applications.
2. Understand the BJT operation and its biasing concepts.
3. Analyze the Small signal model of BJT.
4. Understand the operation of FET and its biasing.
5. Know the special purpose electronic devices in various applications.

Blooms Level of Learning

- L2
L2
L4
L2
L1

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
20A222T 1	-	3	2	-	-	-	-	1	-	-	1	-	3	-
20A222T 2	-	3	3	-	1	-	-	2	-	-	1	-	3	-
20A222T 3	-	3	2	-	1	-	-	1	-	-	2	-	2	3
20A222T 4	-	3	2	-	1	-	-	1	-	-	2	-	2	-
20A222T 5	-	3	2	-	1	-	-	1	-	-	1	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Electrical and Electronics Engineering

Title of the Course Chemistry Lab
Category BSC
Course Code 20AC23L

Year I Year
Semester II Semester
Branch Common to EEE & ECE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To familiarize the students with the basic concepts of chemistry
- To train the students on how to handle the instruments.
- To familiarize the students with digital and instrumental methods of analysis.
- To expose the students in practical aspects of the theoretical concepts.

List of experiments

From the following list, any 10 experiments must be performed in a semester

1. Determination of Zinc by EDTA method.
2. Estimation of active chlorine content in Bleaching powder
3. Determination of copper by Iodometry
4. Estimation of ferrous iron by Dichrometry
5. Preparation of Phenol-Formaldehyde resin
6. Determination of Fe (II) in Mohr's salt by potentiometric method
7. Determination of chromium (VI) in potassium dichromate
8. Conductometric titration of Acid mixture against Strong base
9. Determination of strength of an acid by pH metric method
10. Determination of viscosity of a liquid
11. Determination of functional groups in the given organic compound
12. Thin layer chromatography

Prescribed Textbooks:

1. J. Mendham, R.C Denney, J.D Barnes, M. Thomas, B. Sivasankar Vogel's Quantitative Chemical Analysis 6/e, Pearson publishers, 2009.
2. N.K Bhasin and Sudha Rani Laboratory Manual on Engineering Chemistry 3/e, Dhanpat Rai Publishing Company 2009.

Course Outcomes:

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

- | | |
|---|--------------------------|
| | Blooms Level of Learning |
| 1. Explain the functioning of instruments such as ph meter, conductivity meter and potentiometer. | L4 |
| 2. Estimate Zn, Cr, Fe, Cu and other functional groups in various samples | L2 |
| 3. Determine physical properties of liquids and synthesize polymers and nanomaterials | L3 |

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AC23L.1	3	2	-	-	-	-	-	-	-	-	-	2	3	-	-
20AC23L.2	3	2	-	-	-	-	-	-	-	-	-	2	3	-	-
20AC23L.3	3	2	-	-	-	-	-	-	-	-	-	2	2	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Fundamentals of Electronic Devices and Circuits Lab
 Lab Category ESC
 Course Code 20A222L
 Year I Year
 Semester II Semester
 Branch EEE

Lecture Hours Tutorial Hours Practical Credits
 0 0 3 1.5

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.

List of the 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, BJTs, Active Devices, Low power JFETs, MOSFETs, Photodiode, Phototransistor, LEDs, SCR and UJT.
2. Study and operation of
 - Multi-meters (Analog and Digital)
 - Function Generator
 - Regulated Power Supplies
 - CRO
3. Verification of Kirchhoff's Voltage and Current Law.
4. Forward and Reverse Bias Characteristics of PN junction Diode and Zener Diode.
5. Half Wave Rectifier with and without filter.
6. Full Wave (Center trapped) Rectifier with and without filter.
7. Input and Output Characteristics of Transistor in CE Configuration.
8. JFET Characteristics.
9. MOSFET Characteristics
10. Frequency response of CE Amplifier.
11. SCR Characteristics.
12. LED Characteristics.

Course Outcomes:

Student will be able to

Blooms Level of Learning

- | | |
|--|----|
| 1. Gain the practical knowledge of Diode, BJT, JFET, MOSFET and some special electronic devices. | L1 |
| 2. Design the amplifier circuits under given requirements. | L5 |

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
20A222L.1	2	2	2	2	2	-	2	-	2	-	-	2	2	2
20A222L.2	2	2	2	2	2	-	2	-	2	-	-	2	2	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Humanities and Sciences

Title of the Course Communicative English Lab
Category HSMC
Course Code 20AC25L

Year I B. Tech.
Semester II Semester
Branch Common To EEE & ECE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To learn better English pronunciation
2. To use language effectively in everyday conversations
3. To make formal oral presentations using effective strategies in professional life
4. To be exposed to a variety of self-instructional, learner friendly modes of language learning

Detailed Syllabus:

Pronunciation: 6

Introduction to English speech sounds

Learning Outcome:

At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English and speak in intelligible way

Listening Comprehension: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. Answering a series of questions about main idea and supporting ideas after listening to audio texts. Listening for global comprehension and summarizing what is listened to.

Learning Outcome:

At the end of the module, the learners will be able to

- Adopt better strategies to listen attentively and comprehend attentively

Speaking 24

Situational Dialogues (Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions - Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.)

Oral Presentations: Formal oral presentations on topics from academic contexts - Formal presentations using PPT slides with graphic elements, deliver an enthusiastic and well-practiced presentation

Describing people and situations (learn new adjectives, practice describing themselves and others, describe objects using proper adjectives, use details in pictures to make predictions orally, describing situations, Integrate and evaluate information presented in diverse media visually and orally

Learning Outcomes:

At the end of the module, the learners will be able to

- speak confidently in formal and informal contexts
- comprehend and produce short talks on general topics
- use specific vocabulary to describe different persons, places and objects

Reading 6

Information Transfer (Studying the use of graphic elements in texts to convey information, reveal trends/ patterns/ relationships, communicate processes or display complicated data.

Learning Outcome:

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

- Analyze data given in an infographic and write/speak about it

Minimum Requirements:

1. Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
2. Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a T. V. an LCD projector, a digital stereo –audio & video system and camcorder etc.

Prescribed Textbook: Lab Manual developed by Faculty Members of AITS Rajampet

Suggested Software:

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

Course Outcomes:

Student will be able to

Blooms Level
of Learning

- | | |
|--|----|
| 1. Neutralize their pronunciation of English sounds, and their accent | L3 |
| 2. Adopt effective listening skills for better comprehension of English, spoken by native speakers | L2 |
| 3. Illustrate themselves in social and professional context effectively | L3 |
| 4. Improve their public speaking skills and make technical presentations confidently | L4 |
| 5. Describe people and situations using adjectives effectively | L3 |
| 6. Assess and Deduct data from graphs/pie charts/tables | L3 |

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
20AC25L.1	-	-	-	-	-	-	-	-	-	2	-	1	-	-
20AC25L.2	-	-	-	-	-	-	-	-	-	1	-	2	-	-
20AC25L.3	-	-	-	-	-	-	-	-	3	3	-	3	-	-
20AC25L.4	-	-	-	-	-	-	-	-	3	2	-	1	-	-
20AC25L.5	-	-	-	-	-	-	-	-	1	3	-	3	-	-
20AC25L.6	-	-	-	-	-	-	-	-	-	2	-	1	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Humanities and Sciences

Title of the Course	Environmental Science
Category	MC
Course Code	20AC26T
Year	I
Semester	II
Branch	Common To EEE & ECE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	0

Course Objectives:

- To make the student to get awareness on environment and understand the importance of protecting natural resources.
- To enable the student to know the importance of ecosystems and biodiversity for future generations.
- To make the student to know pollution problems due to the day-to-day activities of human life.
- To enable the student to acquire skills for identifying and solving the social issues related to environment.
- To enable the student to understand the impact of human population on the environment.

Unit 1 Multidisciplinary Nature of Environmental Studies 10
 Definition, Scope and Importance – Need for Public Awareness. NATURAL RESOURCES: Renewable and non-renewable resources – Forest resources: Uses, deforestation– Water resources: Uses, floods, drought – Mineral resources: Uses, environmental effects of extracting mineral resources – Food resources: Impacts of overgrazing, problems with traditional agriculture, effects of modern agriculture – Land Resources: Land degradation, soil erosion - Energy resources: Renewable and non-renewable energy resources.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the importance of public awareness.
- Know about the various natural resources.

Unit 2 Ecosystems, Biodiversity and its Conservation 10
 Ecosystems: Producers, consumers and decomposers – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, lake ecosystem.
 Biodiversity and Its Conservation: Definition – Value of biodiversity - Hot-spots of biodiversity – Threats to biodiversity – Conservation of biodiversity.

Learning Outcomes: At the end of the unit, the student will be able to:

- Know about the concept of ecosystem.
- Know about the importance of biodiversity.

Unit 3 Environmental Pollution 8
 Definition, Causes, effects and control measures of: Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.

Learning Outcomes: At the end of the unit, the student will be able to:

- Know about the different types of pollution.
- Know about various sources, effects and control measures of pollution.

Unit 4 Social Issues and the Environment 10
 Rain water harvesting, Environmental ethics: Issues and possible solutions – global warming, acid rain, ozone layer depletion – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act.

Learning Outcomes: At the end of the unit, the student will be able to:

- Know about social issues related to environment.
- Know about importance of environmental acts.

Unit 5 Human Population and the Environment

7

Population explosion – Family Welfare Programmes – Environment and human health – Value Education – HIV/AIDS – Role of information Technology in Environment and human health, Field work – Visit to a local area to document environmental assets.

Learning Outcomes: At the end of the unit, the student will be able to:

- Know about the effects of population explosion.
- Identify the natural assets and their relationship.

Prescribed Textbooks:

1. Perspectives in environmental Studies, Anubha Kaushik and C P Kaushik, New Age International Publishers, New Delhi, 2018.
2. A Textbook of Environmental Studies, Shashi Chawla, McGraw Hill Education, New Delhi, 2017.

Reference Books:

1. Environmental Studies by Benny Joseph, McGraw Hill Education, New Delhi, 2017.
2. A textbook of environmental studies, A Dhinakaran and B Sankaran, Himalaya Publishing House, Mumbai, 2017.
3. Fundamentals of environmental studies, Mahua Basu and S Xavier, Cambridge University Press, New Delhi, 2017.
4. Textbook of Environmental Studies for undergraduate courses, ErachBharucha for University Grant Commission, University press, New Delhi, 2013.
5. A textbook of environmental studies, Vijay kumarTiwari, Himalaya Publishing House, Mumbai, 2017.

Course Outcomes:

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

- | | |
|--|--------------------------------|
| 1. Explain how natural resources should be used. | Blooms Level of Learning
L2 |
| 2. Identify the need to protect ecosystems and biodiversity for future generations. | L3 |
| 3. List out the causes, effects, and control measures of environmental pollution. | L1 |
| 4. Demonstrate knowledge to the society in the proper utilization of goods and services. | L2 |
| 5. Outline the interconnectedness of human dependence on the earth's ecosystems. | L2 |

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
20AC26T.1	1	1	-	-	-	3	3	1	-	-	-	3	-	-
20AC26T.2	1	2	-	-	-	3	3	1	-	-	-	3	-	-
20AC26T.3	-	1	-	-	-	3	3	1	-	-	-	3	-	-
20AC26T.4	2	-	-	-	-	3	3	1	-	-	-	3	-	-
20AC26T.5	1	-	-	-	-	3	3	1	-	-	-	3	-	-