ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET

(An Autonomous Institution)

ACADEMIC REGULATIONS (R19), COURSE STRUCTURE AND SYLLABI

For the students admitted to

B. Tech., Regular Four Year Degree Programme from the Academic Year 2019-20

and

B. Tech., Lateral Entry Scheme from the Academic Year 2020-21

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 REGULAR DEGREE PROGRAMME

APPLICABLE FOR THE STUDENT BATCHES ADMITTED FROM THE ACADEMIC YEAR 2019-20

APPLICABLE FOR THE STUDENTS (Lateral Entry) ADMITTED FROM THE ACADEMIC YEAR 2020-21

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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 2019-20.

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 2019-20 and Lateral Entry students admitted from the academic year 2020-21
- 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 R19 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 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 2019-2020.

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

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
Innovation/Socially Relevant Project/Entrepreneurship/Internship	N/A	02
Project Work Stage 1	04	02
Project Work Stage 2	12	08

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 Courses	
Management Courses	E
Civil Engineering	1
Electrical and Electronics Engineering	2
Mechanical Engineering	3
Electronics & Communication Engineering	4
Computer Science & Engineering	5

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	DEPARTMENT				
		CIV	EEE	ME	ECE	CSE
Foundation	Engineering Sciences (ES)	23.5	22.5	22.5	24	23
	Basic Sciences (BS)	25	25	25	25	25
	Humanities & Social Sciences and Management (HS)	10	10	10	10	10
Core	Professional Core (PC)	59.5	60.5	60.5	59	60
Project	Project (PW)	10	10	10	10	10
	Internship	2	2	2	2	2
Elective courses	Professional Elective (PE)	18	18	18	18	18
	Open Elective (OE) (including one MOOCs)	12	12	12	12	12
Mandatory Courses	Mandatory (MC)	-	-	-	-	-
	Total Credits	160	160	160	160	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.

Students have to register for a total of 6 professional core electives courses (PE-1 to PE-6) 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 (OE1) offered by their concerned department. However, two Open Electives are inter-disciplinary and shall be offered by other branches.

One open elective is 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 opt for a MOOC available on several online platforms such as NPTEL, Swayam etc, as an Open Elective.
- 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 Value Added Courses

- Value-added courses / certificate courses offered by Departments or through joint ventures with various industries / organizations to provide ample scope for the students to keep up with the latest technologies pertaining to their chosen field of studies.
- A four or five value added Programmes shall be proposed by the departments one week before the commencement of classes.
- The students are given liberty to choose the list of Value-added courses given as per their interest.
- Students interested in pursuing value added courses shall register for the courses, paying the stipulated fees, at the department office at the beginning of the semester against the courses that are announced by the department.
- Course progress shall be monitored by the course coordinator designated by the HoD.

- Result of value-added courses shall be declared with **"Satisfactory" or "Not Satisfactory"** performance
- Grade obtained through value added course shall not be considered for the CGPA calculation.
- A student shall complete at least TWO Value-added courses in order to be eligible for the award of the degree.
- Value added courses offered by Department / Institution are only valid.
- Value added courses are conducted beyond the working hours/on holidays.
- The duration of the value-added course should not be less than 40 learning hours.

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.

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 8.1.2
- Project stage-I, Socially-relevant project / Internship / Entrepreneurship activity shall be evaluated for 50 marks based on the Presentation/report submitted by the student.
- Project stage-II shall be evaluated for 200 marks. Mandatory courses with no credits shall be evaluated for 100 marks.

8.1 Internal Evaluation

8.1.1 Theory Internal Examinations

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 20 marks. Remaining 10 marks is for continuous evaluation which includes weekly/ fortnightly class tests, homework assignments, problem solving, group discussions, quiz, seminar, mini-project and other means. The method of allotting these marks will be decided by the teacher dealing that subject in consultation with the Head of the Department. Teacher has to announce the evaluation method in the beginning of the semester.

First midterm 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.

The question paper shall be of subjective type in which four questions with an internal choice are to be answered. 80 % weightage for the best performance and 20 % for 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: (19x0.8) + (10x0.2) = 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: (18x0.8) + (0x0.2) = 14.4

For Lab Course, there shall be a continuous internal evaluation during the semester for 30 marks. Out of the 30 marks, day-to-day performance of the student in the laboratory shall be evaluated for 20 marks by the concerned laboratory teacher based on experimental correctness/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.

Note: For some courses namely, Engineering Graphics - I & II 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 (10 marks for PART-A and 10 marks for PART-B) by the teacher concerned based on the exercises/submissions prepared in the class. Two midterm examinations shall be conducted in a semester for a 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 evaluation and the midterm examination marks will be the final internal evaluation 30 marks for the subject. End examination shall be from Part-A only for 70 marks.

8.1.3 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.

8.1.4 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. The question paper shall be of subjective type with 5 questions, one question from each unit, with internal choice. All questions carry equal marks of 14 each.

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 Innovative project / Socially relevant project / Entrepreneurship / Internship (Industry / Govt. / NGO / MSME / Online)

Innovative project / Socially relevant project / Entrepreneurship / Internship (Industry / Govt. / NGO / MSME / Online) activity carries 2 credits. A student can take part in any one of the activities during 6th Semester or during the summer break between 6th and 7th semester.

The student shall submit a certificate in support of his/her participation/activity to the Head of the Department. Such certificate shall be considered for the award of 2 credits by a departmental committee consisting of Head of the Department along with two senior faculty members of the Department. If a student fails to submit Certificate of participation, he will be declared FAIL in this activity, till any such certificate is submitted to the Head of Department or any such activity is undertaken by the student.

Innovative Project: A solution of practical consequence to an existing problem which

- lacks a feasible solution or a solution of practical consequence which is capable of replacing a solution to an existing problem which satisfy one or a few of these properties, easily implementable/sustainable/environmentally friendly/cheaper/outreach to remote locations inaccessible by the current solution
- solves the problem creates by the current solution/Industrial applicable solution
- minimises the attrition rate of the instruments (eg solar lamps in remote locations, which can be easily assembled in the remote location).

A part of the solution to an existing problem satisfying the above conditions. An activity rendering added benefits to a current usage of a product.

Socially Relevant Project: A student can pursue a socially relevant project/internship to solve pressing problems of the society. These innovative projects shall contribute to the national development goals and priorities. Topics/ representative activities can be found on Departmental Webpage/Curriculum/Head of the Department. Innovative Project / Socially relevant project can be taken up by an individual student or by a team of 5 students.

Entrepreneurship: Entrepreneurship activities (start-up ideas) are encouraged to trigger an entrepreneurial culture and inculcate entrepreneurial values and influence the mind-set of engineering students towards entrepreneurship. Entrepreneurship activity shall be evaluated upon submission of a detailed report by the student and if found satisfactory the student shall be awarded 2 credits and the entrepreneurial idea shall be incubated in Institute Innovation Cell to help entrepreneurs navigate the transition from ideas to successful businesses. (Entrepreneurship activity is a certification course/programme)

Internship (Industry / Govt / NGO / MSME / Online)

During the summer vacation during 6th semester, students are ready for industrial experience. Therefore, they may choose to undergo Internship with industry related activities. Students may choose either to work on entrepreneurial activities resulting in start-up or undergo internship with industry/ NGOs/ Government organizations/ Micro/ Small/ Medium enterprises to make them ready for the industry. The student shall submit a certificate in support of his/her participation to the Head of the Department. Such certificate shall be evaluated for the award of 2 credits by committee consisting of Head of the Department along with two senior faculty members of the Department. The duration of the participation and guidelines for the activity shall be decided by the respective Head of the Department.

Detailed guidelines are given in Appendix I.

9.2 Project Work Stage I

Project Stage I consists of a presentation of **Abstract of the main project** in the 7th 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. Out of which, project work stage–I shall be evaluated for 50 marks at the end of 7th semester for the award of 2 credits in **7th Semester** and project stage-II for 150 marks in 8th semester.

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 2 credits assigned, if his report for Stage I is declared Satisfactory by the committee based on Rubrics set by the Department for evaluation.

If a student fails in Project work stage-I, 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 Project Stage-II.

9.3 Project Work Stage II

Out of a total of 150 marks for the **Project work stage –II**, 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 100 marks shall be awarded by a committee consisting of HOD, project Supervisor and an External Examiner nominated by the Principal or Dean Academics.

Project work shall start in 7th semester and shall continue in the 8th semester. A student shall acquire 8 credits assigned to project work. The evaluation of project work shall be conducted at the end of **the 8th semester.**

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 Project work. Further such students shall re-appear as and when next year 8th semester supplementary examinations are conducted.

10. ATTENDANCE REQUIREMENTS AND DETENTION POLICY

- A student shall maintain a minimum required attendance of 75% in AGGREGATE.
- 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.

11. 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.

11.1 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.

11.2 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.

11.3. 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.

11.4 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

11.5 A student shall be qualified in two certificate courses (value-added courses) of 40 hours duration each during his/her course of study. Please refer to Value-added Courses description.

11.6 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.

12. 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	S	Superior	10
≥80 and ≤89.99	E	Excellent	9
≥70 and ≤79.99	A	Very Good	8
≥60 and ≤69.99	B	Good	7
≥50 and ≤59.99	C	Average	6
≥40 and ≤49.99	D	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

12.1 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:

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

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

Where

$C_{i.}$ = Number of credits allotted to a particular curse ‘i’

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

$i = 1,2,\ldots.p$ 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.

12.2 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

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

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

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

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

12.3 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	S	10	3*10=30
Course 3	2.5	S	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 SGPA : 8.75	Credit : 20 SGPA : 8.25	Credit : 22 SGPA : 7.89	Credit: 23 SGPA : 8.21	Credit : 22 SGPA : 7.86

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

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

12.4 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.

Percentage = 9.5 * CGPA

13. 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.

14. 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.

15. 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

16. Minimum Instruction Days for a Semester

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

17. 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.

18. 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.

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

Challenge valuation:

- Applications are invited from the students, who wish to apply for Challenge Valuation in the subjects of the B.Tech Regular and Supplementary examinations
- The student will apply for Challenge valuation in a specified application and should be routed through the HOD concerned.
- The students who have applied for the revaluation for a paper(s) of an examination are only eligible for the Challenge Valuation of that paper(s) of that examination.
- A Fee of Rs. 10000/- (Ten Thousand Rupees Only) for each paper is to be paid within the last date for challenge valuation.
- A Xerox copy of the answer script will be provided to the student on receipt of the payment of fee and date and time of the valuation will be informed to the student, so that valuation will be done in the presence of the teacher attended in support of the student nominated by the HOD concerned.
- The HOD concerned will nominate a teacher of the concerned subject to observe the valuation in support of the student. This will be done 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
	If the candidate:	
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(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 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 examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the

		candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If students of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in nay 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. Constitution of India (mandatory non-credit course prescribed at 3/4 semester)
3. Essence of Indian Traditional Knowledge (mandatory non-credit course prescribed at 3/4 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.

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	19A501	Proficiency classes: Familiarity with a computer	2	2
Regular Phase	19AC01	Proficiency classes: English Communication Skills	2	2
Regular Phase	19A502	Basics of Programming and Lab	3	2
Regular Phase	19AC02	Foundation classes in Mathematics	3	0
Regular Phase	19AC03	Foundation classes in Physics	3	2
Regular Phase	19AC04	Foundation classes in Chemistry	3	2
Regular Phase	19AC05	Universal Human Values	2	0
Regular Phase	19A301	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		

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET (AUTONOMOUS)

Department of Electrical and Electronics Engineering

VISION AND MISSION OF THE DEPARTMENT

Vision

We envision the Department as one of the best in the region with a stimulating Environment to make an impact on, and lead in the field through its Education and Research

Mission

The mission of the Department is to provide an excellent and comprehensive education in the field of Electrical and Electronics Engineering which in turn mould students for a wide range of careers and to exhibit a high level of Professionalism, ethical behavior and social responsibility

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To experience success in Electrical & Electronics Engineering and other diverse fields that requires analytical and technical skills.

PEO2: To prepare students to identify and implement global, societal needs and constraints in designing new technology/product and follow professional ethics.

PEO3: To inculcate in students professional attitude, effective communication skills and leadership qualities to succeed in multi-disciplinary teams.

PEO4: To promote students to pursue professional development by continuous learning relevant to their career.

PROGRAMME OUTCOMES(POs)

A graduate of Electrical and Electronics Engineering will have ability to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make

1. Effective presentations, and give and receive clear instructions

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMMME SPECIFIC OUTCOMES

1. Able to analyze, design, and implement electrical & electronics systems and deal with the rapid pace of industrial innovations and developments
2. Skillful to use application and control techniques to conventional and non-conventional energy systems.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES
(AUTONOMOUS)
RAJAMPET
Department of Electrical and Electronics Engineering
I B. Tech - Zero Semester

Phase	Course Code	Name of the course	Lecture	Practical
Regular Phase	19A501	Proficiency classes: Familiarity with a computer	2	2
Regular Phase	19AC01	Proficiency classes: English Communication Skills	2	2
Regular Phase	19A502	Basics of Programming and Lab	3	2
Regular Phase	19AC02	Foundation classes in Mathematics	3	0
Regular Phase	19AC03	Foundation classes in Physics	3	2
Regular Phase	19AC04	Foundation classes in Chemistry	3	2
Regular Phase	19AC05	Universal Human Values	2	0
Regular Phase	19A301	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		

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES
(AUTONOMOUS)
RAJAMPET
Department of Electrical and Electronics Engineering

Course Structure for R19 Regulations
I Year I Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	BS	19AC12T	Applied Physics	3	-	-	3
2	BS	19AC11T	Algebra and Calculus	3	1	-	4
3	ES	19A511T	Problem Solving and C Programming	3	-	-	3
4	ES	19A411T	Essentials of Electrical & Electronics Engineering	2	-	-	2
5	ES	19A312T	Engineering Graphics & Design	1	-	3	2.5
Lab Courses							
6	BS	19AC12L	Applied Physics Lab	-	-	3	1.5
7	ES	19A313L	Engineering & IT Workshop	-	-	3	1.5
8	ES	19A511L	C Programming Lab	-	-	3	1.5
9	ES	19A411L	Essentials of Electrical & Electronics Engineering Lab	-	-	2	1
				12	1	14	20

I Year II Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	HS	19AC25T	Functional English and Life Skills	3	-	-	3
2	ES	19A522T	Programming Through Python	3	-	-	3
3	BS	19AC24T	Engineering Chemistry	3	-	-	3
4	BS	19AC21T	Differential Equations and Vector Calculus	3	1	-	4
5	ES	19A421T	Electronic Devices and Circuits	2	-	-	2
6	MC	19AC26T	Environmental Science	3	-	-	-
Lab Courses							
7	HS	19AC25L	Communicative English Lab	-	-	3	1.5
8	ES	19A522L	Programming Through Python Lab	-	-	2	1
9	BS	19AC24L	Engineering Chemistry Lab	-	-	3	1.5
10	ES	19A421L	Electronic Devices and Circuits Lab	-	-	2	1
				17	1	10	20

II Year I Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	BS	19AC31T	Partial Differential Equations and Complex Variables	3	-	-	3
2	PC	19A231T	Analog Electronics	3	-	-	3
3	PC	19A232T	Circuit Theory	3	-	-	3
4	PC	19A233T	Electrical Machines-I	3	-	-	3
5	PC	19A234T	Switching Theory and Logic Design	3	-	-	3
6	ES	19A337T	Fluid Mechanics and Hydraulic Machinery	2	1	-	3
7	MC	19AC35T	Essence of Indian Traditional Knowledge	3	-	-	-
Lab Courses							
8	ES	19A337L	Fluid Mechanics and Hydraulic Machinery Lab	-	-	2	1
9	PC	19A231L	Analog Electronics lab	-	-	2	1
10	PC	19A233L	Electrical Machines -I Lab	-	-	2	1
				20	1	6	21

II Year II Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	BS	19AC42T	Numerical Methods and Transform Techniques	3	-	-	3
2	PC	19A241T	Electrical Machines -II	3	-	-	3
3	PC	19A242T	Electromagnetic Fields	3	-	-	3
4	PC	19A243T	Generation and Transmission of Electric Power	3	-	-	3
5	PC	19A244T	Linear Control Systems	3	-	-	3
6	PC	19A245T	Network Analysis and Synthesis	3	-	-	3
7	BS	19AC44T	Life Sciences for Engineers	2	-	-	2
8	MC	19AC47T	Constitution of India	3	-	-	-
Lab Courses							
8	PC	19A241L	Electrical Machines -II Lab	-	-	3	1.5
9	PC	19A245L	Electrical Circuits and Simulation Lab	-	-	3	1.5
				23	0	6	23

III Year I Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	HS	19A354T	Management Science	3	-	-	3
2	PC	19A251T	Electrical and Electronic Measurements	3	-	-	3
3	PC	19A252T	Power Electronics	3	-	-	3
4	PC	19A253T	Power System Analysis	3	-	-	3
5	PE	19A25AT	Digital Control Systems	3	-	-	3
		19A25BT	Special Electrical Machines				
		19A25CT	Modern Control Theory				
6	OE	19A25DT	Fuzzy Logic and Neural Network	3	-	-	3
		19A25ET	Battery Energy Storage Systems				
		19A25FT	System Modeling and Simulation				
Lab Courses							
7	PC	19A254L	Electrical Measurements Lab	-	-	2	1
8	PC	19A255L	Control Systems & Simulation Lab	-	-	2	1
9	HS	19AC52L	Professional Communication Skills Lab	-	-	3	1.5
				18	0	7	21.5

III Year II Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PC	19A261T	Microprocessors and Microcontrollers	3	-	-	3
2	PC	19A262T	Power System Operation and Control	2	-	-	2
3	PC	19A263T	Switch Gear and Protection	3	-	-	3
4	PE	19A26AT	High Voltage Engineering	3	-	-	3
		19A26BT	Electrical Machine Design				
		19A26CT	Utilization of Electrical Energy				
5	PE	19A26DT	Instrumentation	3	-	-	3
		19A26ET	Fundamentals of HVDC & FACTS Devices				
		19A26FT	Advanced Power Electronic Converters				
6	OE	19A26IT	Open Elective-2 (MOOCS)	3	-	-	3
Lab Courses							
7	PC	19A264L	Power System Simulation Lab	-	-	2	1
8	PC	19A265L	Power Electronics & Simulation Lab	-	-	2	1.5
9	HS	19AC61L	General Aptitude	1	-	-	1
9	INTERN	19A264I	Innovative project / Socially relevant project / Entrepreneurship / Internship	-	-	-	2
				18	0	4	22.5

IV Year I Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PC	19A271T	Distribution of Electric Power	3	-	-	3
2	PC	19A272T	Power Semiconductor Drives	3	-	-	2
3	PE	19A27AT	Renewable Energy Systems	3	-	-	3
		19A27BT	Smart Grid				
		19A27CT	Principles of Power Quality				
4	PE	19A27DT	Programmable Logic Controllers	3	-	-	3
		19A27ET	Hybrid Electric Vehicles				
		19A27FT	Digital Signal Processing				
5	OE	19A17GT	Basic Civil Engineering	3	-	-	3
		19A17HT	Water Resources and Conservation				
		19A37JT	Introduction to Mechatronics				
		19A37KT	Fundamentals of Robotics				
		19A37LT	Non-Conventional Sources of Energy				
		19A47GT	Electronic Circuits and its Applications				
		19A47HT	Basics of Communication Systems				
		19A57ET	Artificial Intelligence				
		19A57FT	Cyber Security				
Lab Courses							
6	PC	19A273L	Power Systems Lab	-	-	2	1
7	PC	19A274L	Microprocessors and Microcontrollers Lab	-	-	2	1
8	PW	19A275P	Project Phase-I	-	-	-	2
				15	0	4	18

IV Year II Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PE	19A28AT	Design of Electrical Systems	3	-	-	3
		19A28BT	Distributed Energy systems				
		19A28CT	Energy Auditing and Demand Side Management				
2	OE	19A18DT	Disaster Management	3	-	-	3
		19A18ET	Building Planning and Construction				
		19A38ET	Entrepreneurship Development				
		19A38FT	Optimization in Engineering				
		19A38GT	Total Quality Management				
		19A48DT	Introduction to Digital Design				
		19A48ET	Industrial Electronics				
		19A58ET	Internet of Things				
		19A58FT	Web Programming				
Lab Courses							
3	PW	19A281P	Project Phase-II	-	-	-	8
				6	-	-	14

OPEN ELECTIVE COURSES (For Other Departments offered by EEE)

S. No.	Category	Course Code	Course Title	Offered to
1	OE2	19A26GT	Energy Management and Conservation	CE, ME & CSE Students
2	OE2	19A26HT	Fuzzy Logic and Neural Network	
3	OE3	19A27GT	Energy Management and conservation	ECE Students (For CE,ME & CSE-MOOCS)
4	OE3	19A27HT	Fuzzy Logic and Neural networks	
5	OE4	19A28DT	Battery Energy Storage Systems	CE, ME, CSE & ECE Students
6	OE4	19A28ET	System Modeling and Simulation	

List of Value-added Courses

1. Introduction to MATLAB Programming Techniques.
2. MATLAB SIMULINK for Electrical Systems
3. Electrical CAD
4. Internet of Things Applications to Electrical Engineering
5. Microcontrollers and Embedded Systems
6. PCB Design
7. PLC & SCADA
8. Solar Energy Course

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

Title of the Course	Applied Physics
Category	BS
Couse Code	19AC12T
Year	I B.Tech
Semester	I Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	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.

Unit 2 Dielectric and Magnetic materials 9

Introduction-Dielectric polarization-Dielectric polarizability- Susceptability 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 - ferroelectricity.

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

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 (qualitative).

Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation-Acceptance angle-Numerical Aperture-Classification of fibers based on Refractive index profile,- Propagation of electromagnetic wave through optical fiber –modes-importance of V number-attenuation-Block diagram of fiber optic communication- Medical Applications-Fiber optic Sensors.

Unit 4 Semiconductors 9

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 - 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.

Unit 5 Superconductors and Nano materials 9

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

Nano materials – significance of nanoscale - properties of nanomaterials: physical: mechanical, magnetic, Optic, 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.

Prescribed Text Books

1. M.N. Avadhanulu, P. G. Kshirsagar & TVS. Arunmurthy "A Text book of Engineering Physics", S. Chand Publications,11th editioin,2019
2. H. K. Malik & A .K. Singh "Engineering Physics",- McGraw Hill Publishing Company Ltd, 2018

Reference Text Books:

1. T Pradeep "A Text book of Nano Science and Nano Technology"- Tata Mc Graw Hill 2013
2. David J. Griffiths, "Introduction to Electrodynamics"- 4/e, Pearson Education,2014
3. Gerd Keiser "Optical Fiber Communications"- 4/e, Tata McGrawHill ,2008
4. Charles Kittel "Introduction to Solid State Physics",Wiley Publications,2011
5. S.M.Sze "Semiconductor devices-Physics and Technology"-Wiley,2008

Course Outcomes:

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.	L3 &L2
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
19AC12T .1	3	2	2	-	-	-	-	-	-	-	-	-
19AC12T .2	3	2	2	-	-	-	-	-	-	-	-	2
19AC12T .3	3	2	2	-	-	-	-	-	-	-	-	2
19AC12T .4	3	1	-	-	-	-	-	-	-	-	-	-
19AC12T .5	3	2	2	-	-	-	-	-	-	-	-	2

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

Title of the Course	Algebra and Calculus
Category	BS
Couse Code	19AC11T
Year	I B.Tech
Semester	I Semester (Common to CE, EEE, ME, ECE& CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	1	-	4

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- This course will 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 Matrix Operations and Solving Systems of Linear Equations 9

Rank of a matrix by echelon form - solving system of homogeneous and non-homogeneous linear equations by rank method - Eigen values and Eigen vectors - their properties.

Unit 2 9

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 forms by orthogonal transformation

Unit 3 Functions of several variables 9

Partial derivatives - total derivatives - chain rule - change of variables – Jacobian - maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers for three variables.

Unit 4 Mean value theorems and curve tracing 9

Taylor's and Maclaurin's theorems (without proofs) – simple problems.
Curve tracing – Cartesian and polar curves.

Unit 5 Multiple Integrals and Special Functions 9

Double integrals: Evaluation - change of order of integration - change of variables (Cartesian to polar) - areas enclosed by plane curves and Evaluation of triple integral.
Beta and Gamma functions and their properties - relation between beta and gamma functions.

Prescribed Text Books

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

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Apply the knowledge to solve System of linear equations.	L3
2. Develop the use of matrix algebra techniques that is needed by engineers for practical applications	L3
3. Classify the functions of several variables which is useful in optimization	L4
4. Understand mean value theorems to real life problems and will understand the applications of curve tracing	L2
5. Solve important tools of calculus in higher dimensions and be familiar with 2-dimensional, 3- dimensional coordinate systems and also learn the utilization of special functions	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC11T.1	3	3	-	-	-	-	-	-	-	-	-	3
19AC11T.2	3	2	-	-	-	-	-	-	-	-	-	3
19AC11T.3	3	3	-	-	-	-	-	-	-	-	-	2
19AC11T.4	3	3	-	-	-	-	-	-	-	-	-	2
19AC11T.5	3	3	-	-	-	-	-	-	-	-	-	2

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

Title of the Course	Problem Solving and C programming
Category	ES
Couse Code	19A511T
Year	I B.Tech
Semester	I Semester (Common to CE, EEE, ME, ECE & CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	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 9

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

Unit 2 9

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

Unit 3 9

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

Unit 4 9

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

Unit 5 9

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

Prescribed Text Books

1. 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 Text 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, 2nd Edition, 2017
6. ReemaTharaja “Introduction to C Programming”, Second Edition, OXFORD Press, 2015.

Course Outcomes:

At the end of the course, students 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:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A511T.1	1	2	2	3	-	1	-	-		-	-	-
19A511T.2	3	3	3	3	3	-	-	-	1	-	-	-
19A511T.3	3	2	1	2	1	-	-	-	1	-	-	2
19A511T.4	2	3	2	2	3	-	-	-	1	-	1	2
19A511T.5	3	2	2	2	2	-	-	-	1	-	-	2

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

Title of the Course	Essentials of Electrical & Electronics Engineering
Category	ES
Course Code	19A411T
Year	I B.Tech
Semester	I Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
2	-	-	2

Course Objectives:
- To learn the basic fundamentals of circuit components, circuit laws and network theorems
- To understand the concepts of semiconductor diode and its applications
- To understand the basic concepts of Bipolar Junction transistor

Unit 1 Circuit Elements 9

Sources: Voltage and Current Sources, Resistors-Types- resistance color coding-potentiometer-types, Capacitors-types-uses of capacitors, Inductors-types, Ohm's Law-R, L, C Voltage, Current, Power & Energy.

Unit 2 Network Theorems (D.C. Excitation Only) 9

Ohm's law, Kirchhoff laws-network reduction techniques-series, parallel, series parallel circuits-source transformations. Thevenin'sTheorem- Norton's Theorem- Superposition Theorem-maximum power transfer theorem.

Unit 3 Semiconductor Diodes 9

Energy Band Diagram of Semiconductors (Intrinsic & Extrinsic), PN Diode, Drift & Diffusion currents, V-I Characteristics of PN Junction Diode (Ideal, Simplified and Piece-wise, Practical), Temperature Dependency, Transition and Diffusion Capacitances, Breakdown Mechanisms in semiconductor diodes, Zener diode characteristics &Zener diode acts as a regulator.

Unit 4 Diode Applications 9

Half Wave and Full Wave Rectifiers – General Filter Considerations – Capacitor Filter – RC Filter, Choke Filter, LC Filter, π-Filter.

Unit 5 Introduction of BIT 9

Transistor constructions – types. Transistor operation in CB, CE and CC configurations and their Characteristics, Multimeter, CRO, DSO, Function Generator

Prescribed Text Books:
1. "Electronic Devices and Circuits" David A Bell, Fifth Edition, 2008, Oxford University Press
2. "Circuits & Network Analysis & Synthesis", Sudhakar. A & Shyammohan S Palli, 4th Edition, Tata McGraw Hill, 2010
3. Engineering basics: Electrical, Electronics and computer Engineering" T.Thyagarajan, New Age International, 2007
4. Electronic Devices and Circuits, G K.Mithal

Reference Text Books:
1. Electronic Devices and Circuits, J. Millman and Halkias, 1991 edition, 2008, TMH
2. Electronic Devices and Circuit Theory, Robert L.Boylestad and Louis Nashelsky, 9th edition, PHI
3. Electronic Principles, Albert Malvino, David J Bates, MGH, SIE 2007
4. Micro Electronic Circuits, Sedra and Smith, Oxford University Press

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand the circuit component voltage, current, power and energy relations and their types.	L2
2. Apply the circuit simplification techniques	L3
3. Demonstrate the knowledge of semiconductor diodes.	L2
4. Understand the operation and usage of Rectifiers and filters.	L2
5. Understand the basic concepts of Bipolar Junction Transistor	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A411T.1	2	2	-	-	-	-	-	-	-	-	-	2
19A411T.2	3	3	3	3	3	-	-	-	-	-	-	3
19A411T.3	2	2	-	-	-	-	-	-	-	-	-	2
19A411T.4	2	2	2	-	-	-	-	-	-	-	-	2
19A411T.5	2	-	2	-	-	-	-	-	-	-	-	2

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

Title of the Course	Engineering Graphics & Design
Category	ES
Course Code	19A312T
Year	I B.Tech
Semester	I Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
1	-	3	2.5

Course Objectives:

- To learn engineering drawing sketches and dimensioning.
- To learn basic engineering drawing formats.
- To increase ability for communicating with engineers around the world.
- To prepare the student for future Engineering positions.

PART – A Manual Drawing

Unit 1 Introduction Theory Hours: 05 Practice sessions: 04

Principles of Engineering Graphics and their significance - Lettering – Geometrical constructions - Curves used in Engineering Practice: Conic Sections– General method only. Special methods: Ellipse – Oblong method, Arcs of circle method, concentric circles method – Parabola - Rectangle method and Tangent method – Rectangular Hyperbola
.

Unit 2 Cycloidal Curves Theory Hours: 03 Practice Sessions: 06

Cycloid, Epicycloid and Hypocycloid (treatment of simple problems only)
Involutes – Square, Pentagon, Hexagon and Circle.

Unit 3 Projections of Points and Lines Theory Hours: 05 Practice Sessions: 04

Projections of Points and Projections of Lines-inclined to one reference plane - inclined to both reference planes, finding the True lengths.

Unit 4 Projections of Planes Theory Hours: 04 Practice Sessions: 05

PROJECTIONS OF PLANES: Projections of regular Plane surfaces inclined to one reference plane and both reference planes.

Unit 5 Projections of Solids & Conversion of Views

Projections of Solids: Projections of Regular Solids – Cylinder, Cone, Prism and Pyramid - inclined to one reference and both reference planes.
Conversion of Views: Conversion of Isometric views to Orthographic Views and Conversion of Orthographic views to Isometric views.

PART – B : Computer Aided Drafting (For Internal Evaluation Weightage only)
Theory Hours: 03 Practice Sessions: 03

Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions. Dimensioning principles and conventional representations. Free hand sketches on isometric views to orthographic views.

Prescribed Text Books:

1. Engineering Drawing, N.D. Bhatt, Charotar Publishers, Edition 2016
2. Engineering Drawing, K.L. Narayana, P. Kanniah, Scitech Pub, Edi 2016

Reference Books:

1. Engineering Drawing and Graphics, Venugopal/ New age, Ed 2015.
2. Engineering Drawing, Johle, Tata McGraw-Hill. Ed 2014
3. Engineering Drawing, Shah and Rana, 2/e, Pearson Education Ed 2015

Course Outcomes:

Student will be able to,	Blooms Level of Learning
1. Understand the concepts of Conic Sections.	L1, L2
2. Understand the concept of Cycloidal Curves, Involutes and the application of industry standards.	L2, L3
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.	L2, L3
4. Understand and apply Orthographic Projections of Planes.	L1, L2, L3
5. Understand and analyze the Orthographic Projections of Solids and conversion of isometric views to orthographic views vice versa.	L3, L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A312T.1	3	-	-	-	-	3	2	-	1	2	-	-
19A312T.2	3	-	-	-	-	3	2	-	1	2	-	-
19A312T.3	3	2	-	-	-	3	2	-	1	2	-	-
19A312T.4	3	2	-	-	-	3	2	-	1	2	-	-
19A312T.5	3	-	2	-	2	2	-	3	3	-	-	3

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

Title of the Course	Applied Physics Lab
Category	BS
Couse Code	19AC12L
Year	I B.Tech
Semester	I Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Course Objectives:

- Understand 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.
- Illustrates the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

Note: In the following list, out of 15 experiments, any 10 experiments must be performed in a semester

List of Experiments

1. Determination of the thickness of the wire using wedge method
2. Determination of the radius of curvature of the lens by Newton's ring method
3. Determination of wavelength 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 of 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 acceptance angle
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.

Reference Text Book:

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

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Operate various optical instruments and estimate various optical parameters.	L2
2. Estimate the Various magnetic parameters	L2
3. Measure properties of a semiconductors	L3
4. Determine the properties dielectric materials and optical fiber materials	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC12L.1	3	-	-	-	-	-	-	-	-	-	-	-
19AC12L.2	3	1	-	-	2	-	-	-	-	-	-	-
19AC12L.3	2	-	-	-	2	-	-	-	-	-	-	-
19AC12L.4	3	2	-	-	2	-	-	-	-	-	-	-

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

Title of the Course Engineering & IT Workshop
Category ES
Course Code 19A313L

Year I B.Tech
Semester I Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Engineering Workshop

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.

Trades for exercises Practice hours: 24
Carpentry shop– 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.
Sheet metal shop– Two jobs (exercises) from: Tapered Tray, cylinder, conical funnel from out of 22 or 20 gauge G.I. sheet
Fitting shop– Two jobs (exercises) from: square Fit, V-Fit, Semi-circular fit, dove tail fit from M.S. stock
House-wiring– Two jobs (exercises) from: Parallel and Series, Two-way switch, Tube –Light connection, Stair case connection
Trades for demonstration:
- Plumbing
- Machine Shop
- Metal Cutting
- Soldering and Brazing

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

Course Outcomes:

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. Apply fitting operations in various assemblies.	L3
4. Apply basic electrical engineering knowledge for house wiring practice.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A313L.1	3	-	1	-	1	-	-	-	-	-	-	1
19A313L.2	3	-	1	-	1	-	-	-	-	-	-	1
19A313L.3	3	-	1	-	1	-	-	-	-	-	-	1
19A313L.4	2	-	1	-	1	-	-	-	-	-	-	1

IT Workshop

Course Objectives: This course will

- Demonstrate the disassembling and assembling 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 work place 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.
- Demonstrate the disassembling and assembling of a personal computer system.

Preparing your Computer Practice hours: 9

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and troubleshooting a computer.

Task 3: Install Operating System: Student should install MS Windows on the computer. Students should record the entire installation process.

Internet Practice hours: 3

Task 4: 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 Facebook, skype etc. If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating e-mail account.

Productivity tools Practice hours: 9

Task 5: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 6: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 7: 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, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

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 Dreamtech.
4. MOS 2010 Study Guide for Microsoft Word, Excel, PowerPoint, and Outlook Exams, 1st Edition, Joan Lambert, Joyce Cox, Microsoft Press

Reference Text Books:

1. IT Essentials PC Hardware and Software Companion Guide, CICSO Networking Academy
2. Network Your Computer & Devices Step by Step 1st Edition, CiprianRusen, Microsoft Press
3. Troubleshooting, Maintaining & Repairing PCs, 5th Edition, Bigelow, TMH
4. Introduction to computers, Peter Norton, 6/e, Mc Graw Hill

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Recognize the peripherals of a computer, perform assembling and disassembling of various components of a computer.	L1, L3
2. Describe and perform installation and un-installation of Windows operating systems and also perform troubleshooting of various hardware and software components.	L2, L3
3. Use Web browsers to access Internet, Search Engines.	L3
4. 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
19A313L.5	3	3	1	-	3	-	-	-	-	-	-	3
19A313L.6	3	3	1	-	3	-	-	-	-	-	-	3
19A313L.7	3	3	1	-	3	-	-	-	-	-	-	3
19A313L.8	3	3	1	-	3	-	-	-	-	-	-	3

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

Title of the Course	C Programming Lab
Category	ES
Course Code	19A511L
Year	I B.Tech
Semester	I Semester (Common to CE, EEE, ME, ECE & CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Course Objectives: This course will
- 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 in a modular fashion
- Manage data using files

Minimum number of FOUR programmes from the list of experiments are to be done by students.

Exercise I (week-1): Data types, Variables, Constants and Input and Output.
Exercise 2:(week-2): Operators, Expressions and Type Conversions.
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
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.
Exercise 13:(week-13): Pointers and structures.
Exercise 14:(week-14): Dynamic memory allocation and error handling.
Exercise 15:(week-15): File handling

Recommended Systems/Software Requirements: Intel based desktop PC with ANSI C/ TURBO C Compiler and Supporting Editors

Prescribed Text Books:
1. C and Data Structures, E. Balaguruswamy, Tata McGraw Hill
2. Let Us C, Yeswanth Kanitkar, Ninth Edition, BPB Publication

References:
1. https://www.cprogramming.com/
2. https://www.mycplus.com/tutorials/c-programming-tutorials

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Identify and setup 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
19A511L.1	3	2	-	2	2	-	-	-	2	2	1	-
19A511L.2	2	2	-	-	-	-	-	-	1	-	-	-
19A511L.3	3	3	3	3	-	-	-	-	1	-	-	3
19A511L.4	3	3	3	3	-	-	-	-	-	-	-	3
19A511L.5	3	3	3	3	-	-	-	-	-	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Essentials of Electrical & Electronics Engineering Lab
Category	ES
Course Code	19A411L
Year	I B.Tech
Semester	I Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	2	1

Course Objectives:

- To determine the characteristics of semiconductor diode
- To perform various rectifier circuits in practical approach
- To perform input and output characteristics of BJT for various configurations

List of Experiments

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCBs, Diodes, BJTs.
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.
5. V-I Characteristics of Zener Diode
6. Half Wave Rectifier with and without filter.
7. Full Wave (Center trapped) Rectifier with and without filter.
8. Full Wave (Bridge) Rectifier with and without filter.
9. Zener Diode as a Voltage Regulator.
10. Input and Output Characteristics of Transistor CB Characteristics.
11. Input and Output Characteristics of Transistor CE Characteristics.
12. Input and Output Characteristics of Transistor CC Characteristics.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Determine the parameters like cut-in voltage, resistances and breakdown voltage of semiconductor diode	L5
2. Design DC power supply circuits using rectifiers and filters	L6
3. Choose the desired configuration for specified applications	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A411L.1	2	2	-	-	-	-	-	-	-	-	-	-
19A411L.2	-	2	-	-	-	-	-	-	-	-	2	-
19A411L.3	-	-	2	-	-	-	-	2	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Functional English and Life Skills
Category	HS
Course Code	19AC25T
Year	I B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives:

- To focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- 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
- To build self-confidence, encourage critical thinking, foster independence and help people to communicate more effectively.

Unit 1 9

Reading: *On the Conduct of Life* by William Hazlitt
Life Skills: 'Values and Ethics' with reference to Rudyard Kipling's poem '*If*'
Grammar and Vocabulary: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countables and uncountables; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.
Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Unit 2 9

Reading: *The Brook* by Alfred Tennyson
Life Skills: 'Self-Improvement' with reference to George Bernard Shaw's speech '*How I Became a Public Speaker'*
Grammar and Vocabulary: Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.
Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Unit 3 9

Reading: *The Death Trap* by Saki
Life Skills: 'Time Management' with reference to an extract from Seneca's letter to his friend '*On Saving Time'*
Grammar and Vocabulary: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.
Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.

Unit 4 9

Reading: *ChinduYellamma*
Life Skills: 'Innovation' with reference to the life of 'Muhammad Yunus'
Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms
Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables

Unit 5 9

Reading: *Politics and the English Language b*y George Orwell
Life Skills: 'Motivation with reference to Ranjana Deve's article 'The Dancer with a White Parasol'

Grammar and Vocabulary: Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)
Writing: Writing structured essays on specific topics using suitable claims and evidences

Prescribed Text Books
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

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. read, scan and skim texts such as literary forms, journalistic articles and scientific readings for comprehension and retention	L2
2. exhibit self-confidence and innovative thinking and communicate more effectively	L3
3. understand the factors that influence the use of grammar and vocabulary in speech and writing and formulate sentences with grammatical accuracy	L2
4. 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
19AC25T.1	-	-	-	-	-	-	-	-	-	3	-	2
19AC25T.2	-	-	-	-	-	-	-	-	-	3	-	2
19AC25T.3	-	-	-	-	-	-	-	-	-	3	-	2
19AC25T.4	-	-	-	-	-	-	-	-	-	3	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Programming Through Python
Category	ES
Course Code	19A522T
Year	I B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- To learn basics of computational problem solving, python programming and basic control structures.
- To understand python programming basic constructs like lists, dictionaries, sets and functions
- To learn module design and usage of text files in python programming
- To understand basics of object-oriented programming.
- To understand elementary data structures like linked list, stacks and queues.

Unit 1 9

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

Unit 2 9

Lists: List structures, lists in python, iterating over lists in python, more on python lists
Dictionaries and sets: Dictionary type in python, Set data type
Functions: Program routines, more on functions

Unit 3 9

Module Design: Modules, Top-Down design, python modules
Text Files: Text File, Using Text files, string processing, exception handling

Unit 4 9

Objects and their usage: software objects
Introduction to Object oriented programming: class, three fundamental features of object oriented programming, encapsulation-what is encapsulation, defining classes in python.

Unit 5 9

Data structures: Introduction to abstract data types, Single Linked List-traversing, searching, prepending, and removing nodes, Stacks-implementing using python list& linked list, Queues-implementing using python list& linked list.

Prescribed Text Books:

1. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, Charles Dierbach.
2. Data Structures and Algorithms using Python , Rance D.Necaise, Wiley Publications.

Reference Books:

1. Python Programming using problem solving approach, ReemaThareja, Oxford University press
2. Python Programming: An Introduction to Computer Science, John Zelle, Franklin,Beedle&Associates Inc., 3rd Edition
3. Think Python: How to think like a computer Scientist, Allen Downey 2nd Edition O'Reilly Publications.
4. Problem solving with algorithms and data structures using python, Bradley Miller, David L.Ranum, Franklin, Beedle & Associates incorporated, independent publishers.
5. Learning Python, Mark Lutz, O'Reilly Publications 5th Edition

6. Learn Python the Hard Way: A Very Simple Introduction to the Terrifyingly Beautiful World of Computers and Code Zed Shaw,Zed Shaw's Hard Way Series, Third Edition
7. Automate the Boring Stuff with Python: Practical Programming for Total Beginners, Al Sweigart, 1st Edition.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand computational problem solving and basic elements of python programming.	L1
2. Understand and apply python programming basic constructs like lists, dictionaries, sets and functions.	L1,L3
3. Illustrate module design and usage of text files in python programming	L3
4. Understand apply basics of object-oriented programming in python.	L1,L3
5. Understand and demonstrate elementary data structures.	L1,L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A521T.1	3	-	3	-	-	-	-	-	-	-	-	3
19A521T.2	3	-	3	3	-	-	-	-	-	-	-	3
19A521T.3	3	-	3	3	-	-	-	-	-	-	-	3
19A521T.4	3	-	3	3	-	-	-	-	-	-	-	3
19A521T.5	3	-	3	3	-	-	-	-	-	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Engineering Chemistry
Category	BS
Couse Code	19AC24T
Year	I B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	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 familiarize various sources of renewable energy and explain the construction of photovoltaic cells.
- To explain how to synthesize different polymers and differentiate polymers based on properties.
- To introduce different types of nano-materials, its instrumental techniques and compare molecular machines and molecular switches.

Unit 1 Electrochemical Energy Systems - I 9

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), Concentration Cells.

Unit 2 Electrochemical Energy Systems - Ii 9

Basic concepts, battery characteristics, classification of batteries, Important applications of batteries, Classical batteries-dry/Leclanche cell, Modern batteries-zinc air, lithium cells-Li MnO_2 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 cell

Unit 3 Energy Sources And Applications 9

Solar energy – Introduction - Physical and Chemical properties of Silicon- Production of Solar Grade Silicon from Quartz - Doping of Silicon- p and n type semi conductors- PV cell / solar cell- Manufacturing of Photovoltaic Cells using Chemical Vapor Deposition Technique-applications of solar energy.

Unit 4 Polymer Chemistry 9

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

Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of – Bakelite, urea-formaldehyde, Nylon-6,6 Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – polyacetylene, polyaniline – mechanism of conduction and applications.

Unit 5 Nanomaterials And Molecular Machines & Switches 9

Nanomaterials: Introduction to nanomaterial: nanoparticles, nanocluster, carbon nanotube (CNT) and nanowires. Chemical synthesis of nanomaterials: sol-gel method. Characterization: Principle and applications of scanning electron microscope (SEM) and transmission electron microscope (TEM).

Molecular machines & Molecular switches: Rotaxanes and Catenanes as artificial molecular machines, prototypes – linear motions in rotaxanes, an acid-base controlled molecular shuttle, a molecular elevator, autonomous light-powered molecular motor, systems based on catenanes, molecular switches – introduction, cyclodextrin-based switches, in and out switching, back and forth switching.

Prescribed Text Books

1. P.C. Jain and M. Jain, Engineering Chemistry, 15/e, Dhanapat Rai & Sons, Delhi (2014).
2. B.K. Sharma, Engineering Chemistry, Krishna Prakashan, Meerut.

References Text Books:

1. O G Palanna, Engineering Chemistry, Tata McGraw Hill Education Private Limited, (2009)
2. Sashi Chawla, A Textbook of Engineering Chemistry, Dhanapath Rai and sons, (2003)
3. B.S Murthy and P. Shankar, A Text Book of NanoScience and NanoTechnology, University Press (2013).
4. S.S. Dara, A Textbook of Engineering Chemistry, S.Chand& Co, (2010)
5. N. Krishna Murthy and Anuradha, A text book of Engineering Chemistry, Murthy Publications (2014).
6. K. SeshaMaheshwaramma and MridulaChugh, Engineering Chemistry, Pearson India Edn services, (2016)

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Enumerate different types of electrodes, electrochemical cells and their working	L1
2. Describe the constructing and working of different types of batteries and fuel cells	L2
3. Understand p and n type semiconductors and construction of PV cell	L2
4. explain the preparation, properties, mechanism of conduction and applications of different types of polymers	L4
5. explain the synthesis & analysis of different types of nanomaterials and compare molecular switches with molecular machines	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC24T.1	3	2	-	-	-	-	-	-	-	-	-	2
19AC24T.2	3	2	-	2	-	-	-	-	-	-	-	2
19AC24T.3	2	2	-	2	-	-	-	-	-	-	-	2
19AC24T.4	3	2	-	-	-	-	-	-	-	-	-	-
19AC24T.5	3	2	-	2	-	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Differential Equations and Vector Calculus
Category	BS
Couse Code	19AC21T
Year	I B.Tech
Semester	II Semester (Common to CE, EEE, ME, ECE & CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	1	-	4

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 9

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.

Unit 2 Equations Reducible to Linear Differential Equations and Applications 9

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

Unit 3 Partial Differential Equations 9

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

Unit 4 Vector differentiation and integration 9

Scalar and vector point functions-vector operator del, del applies to scalar point functions-Gradient-del applied to vector point functions-Divergence and Curl-del applied twice to scalar point function-Line integral-circulation-work done-surface integral-flux-volume integral

Unit 5 Vector integral theorems 9

Green's theorem in the plane (without proof) - Stoke's theorem (without proof) - Divergence theorem (without proof)-Applications.

Prescribed Text Books

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

Reference Books

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

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Solve the differential equations related to various engineering fields.	L3
2. Formulate and solve the higher order differential equation by analyzing physical situations.	L3
3. Identify solution methods for partial differential equations that model physical processes.	L3

4. Interpret the physical meaning of different operators such as gradient, curl and divergence and estimate the work done against a field, circulation and flux using vector calculus. L2
5. Evaluate double and triple integrals using Green's, Stoke's and Divergence theorem. L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC21T.1	3	3	-	-	-	-	-	-	-	-	-	2
19AC21T.2	3	3	-	-	-	-	-	-	-	-	-	2
19AC21T.3	3	3	-	-	-	-	-	-	-	-	-	3
19AC21T.4	3	3	-	-	-	-	-	-	-	-	-	2
19AC21T.5	3	3	-	-	-	-	-	-	-	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Electronic Devices and Circuits
Category	ES
Course Code	19A421T
Year	I B.Tech
Semester	II Semester (Common To EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
2	-	-	2

Course Objectives:
- To understand the concepts of biasing and stabilization in BJT
- To understand the concepts of FET, MOSFET and their biasing techniques.
- To analyze the parameters like gain and impedances for single stage amplifier circuits.
- To understand the small signal analysis of FET Amplifiers.
- To understand the working principles of special purpose electronic devices.

Unit 1 Biasing & Stability 9

Overview of BJT Configurations, Transistor Amplifying Action – Load Line Analysis of AC & DC – Operating Point. Types of Biasing: Fixed Bias – Emitter Bias – Emitter Feedback Bias - Collector to Base bias – Voltage Divider Bias. Bias Stability: Need for Stabilization – Stabilization Factors (s,S',S'') – Stability Factors for Voltage Divider Bias - Thermal Stability and Thermal Runaway – Heat Sinks.

Unit 2 Field Effect Transistors & Its Biasing 9

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

Unit 3 Single Stage Amplifiers 9

Single Stage Transistor Amplifier-How Transistor Amplifies- Graphical Demonstration of Transistor Amplifier- Practical Circuit of Transistor Amplifier-Phase Reversal- D.C. and A.C. Equivalent Circuits- Load line Analysis- A.C. emitter resistance-Formula for A.C. emitter resistance-Voltage gain in terms of A.C. emitter Resistance-Voltage gain-Classification of Amplifiers-Amplifier equivalent circuit-Equivalent circuit with signal source-Input impedance of and amplifier.

Unit 4 Amplifiers 9

Small signal model of JFET and MOSFET – Common source and common Drain amplifiers using FET.

Unit 5 Special Purpose Electronic Devices 10

Varactor Diode, Tunnel Diode, LED, PIN Diode, Schottky Diode, SCR, UJT, Photodiode, Phototransistor.

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 Text 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:

Student will be able to	Blooms Level of Learning
1. Understand Biasing and Stabilization conditions of BJT.	L2
2. Understand Biasing and Stabilization conditions of FET.	L2
3. Design the amplifiers circuits under given requirements.	L5
4. Understand the Small signal model of FET.	L2
5. Have the knowledge and usage of special purpose electronic devices in various applications.	L1

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A421T.1	-	3	2	-	-	-	-	1	-	-	1	-	3	-	-
19A421T.2	-	3	3	-	1	-	-	2	-	-	1	-	3	-	-
19A421T.3	-	3	2	-	1	-	-	1	-	-	2	-	2	3	-
19A421T.4	-	3	2	-	1	-	-	1	-	-	2	-	2	-	-
19A421T.5	-	3	2	-	1	-	-	1	-	-	1	-	-	-	3

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

Title of the Course	Environmental Science
Category	MC
Course Code	19AC26T
Year	I B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	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 save earth from the inventions by the engineers.
- 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 9

Definition, Scope and Importance – Need for Public Awareness. NATURAL RESOURCES: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources: Use and over – exploitation, deforestation, dams and their effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources – Food resources: Changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity – Land Resources: Land degradation, soil erosion - Energy resources: Renewable and non-renewable energy resources, use of alternate energy resources.

Unit 2 Ecosystems, Biodiversity, and its Conservation 9

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

BIODIVERSITY AND ITS CONSERVATION : Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit 3 Environmental Pollution and Solid Waste Management 9

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

SOLID WASTE MANAGEMENT: Causes, effects and control measures of urban waste – Role of an individual in prevention of pollution – Pollution case studies.

Unit 4 Social Issues and the Environment 9

SOCIAL ISSUES AND THE ENVIRONMENT: From Unsustainable to Sustainable development – Water conservation, rain water harvesting, Environmental ethics: Issues and possible solutions –global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust – Wasteland reclamation – Consumerism and waste products – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act.

Unit 5 Human Population and the Environment 9

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

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

Prescribed Text Books:

1. Text book of Environmental Studies for undergraduate courses, Erach Bharucha for University Grant Commission, University press, New Delhi, 2004.
2. Environmental Studies, Palaniswamy, Second edition, Pearson education, New Delhi, 2014.

Prescribed Text Books:

1. Environmental Studies, Benny Joseph, Second edition, McGraw Hill Education (India) Private Limited, New Delhi, 2013
2. Environmental Studies from crisis to cure, R. Rajagopalan, Oxford University Press, New Delhi, 2015
3. Environmental Studies: A Text Book for Undergraduates, Dr. K. Mukkanti, S. Chand and Company Ltd, New Delhi, 2010
4. Ecology, Environmental Science and Conservation, J.S. Singh, S.P. Singh and S.R. Gupta, S. Chand and Company Ltd, New Delhi, 2014
5. A Text book of Environmental Studies, Shashi Chawla, Tata McGraw Hill Education, India, 2012

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Explain how natural resources should be used.	L2
2. Identify the importance of protection of different 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
19AC26T.1	1	1	-	-	-	3	3	1	-	-	-	3
19AC26T.2	1	2	-	-	-	3	3	1	-	-	-	3
19AC26T.3	-	1	-	-	-	3	3	1	-	-	-	3
19AC26T.4	2	-	-	-	-	3	3	1	-	-	-	3
19AC26T.5	1	-	-	-	-	3	3	1	-	-	-	3

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

Title of the Course	Communicative English Lab
Category	HS
Couse Code	19AC25L
Year	I B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Course Objectives:
- Students will learn better English pronunciation
- Students will be trained to use language effectively in every day conversations
- Students will be trained to make formal oral presentations using effective strategies in professional life
- Students will be exposed to a variety of self-instructional, learner friendly modes of language learning

Pronunciation 6
Introduction to English speech sounds
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.

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

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.

Minimum Requirement:
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 Text Book: 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
19AC25L.1	-	-	-	-	-	-	-	-	-	2	-	1
19AC25L.2	-	-	-	-	-	-	-	-	-	1	-	2
19AC25L.3	-	-	-	-	-	-	-	-	3	3	-	3
19AC25L.4	-	-	-	-	-	-	-	-	3	2	-	1
19AC25L.5	-	-	-	-	-	-	-	-	1	3	-	3
19AC25L.6	-	-	-	-	-	-	-	-	-	2	-	1

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

Title of the Course	Programming through Python Lab
Category	ES
Course Code	19A522L
Year	I B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	2	1

Course Objectives:
- To practice basics of computational problem solving, python programming and basic control structures.
- To practice python programming basic constructs like lists, dictionaries, sets and functions
- To practice module design and usage of text files in python programming
- To practice basics of object oriented programming and elementary data structures.

List of Experiments
1. Install Python ecosystem and execute “Hello World” program.
2. Practice
   a. Python literals, variables, identifiers and data types
   b. Python operators
   c. Input and output statements.
   d. Control statements
3. Practice Python Programs on Numbers
   a. Prime Numbers
   b. Armstrong Numbers
   c. Fibonacci Numbers and Series
   d. Sum of squares for the first n natural numbers.
   e. Reverse of a number
4. Implement python program on temperature conversion
5. Implement the python program to convert age in seconds.
6. Practice python programs on various types of triangle patterns
7. Implement python programs to find factorial and Fibonacci number using recursion
8. Practice python programs on lists
9. Practice python programs on sets and dictionaries
10. Practice python programs on functions and their implementation
11. Practice any one python program on module design
12. Practice python programs on text files, string processing
13. Practice python program on exception handling
14. Implement python programs on
    i) Stacks ii) Queues
15. Implement Single linked list data structure.

Prescribed Text Books:
1. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, Charles Dierbach
2. Data Structures and Algorithms using Python , RanceD. Necaise, Wiley Publications

Reference Books:
1. Python Programming using problem solving approach, ReemaThareja, Oxford University press
2. Python Programming: An Introduction to Computer Science, John Zelle, Franklin, Beedle & Associates Inc., 3rd Edition
3. Think Python: How to think like a computer Scientist, Allen Downey 2nd Edition O’Reilly Publications.
4. Problem solving with algorithms and data structures using python, Bradley Miller, David L.Ranum, Franklin, Beedle& Associates incorporated, independent publishers.
5. Learning Python, Mark Lutz, O’Reilly Publications 5th Edition

6. Learn Python the Hard Way: A Very Simple Introduction to the Terrifyingly Beautiful World of Computers and Code Zed Shaw,Zed Shaw's Hard Way Series, Third Edition
7. Automate the Boring Stuff with Python: Practical Programming for Total Beginners, Al Sweigart, 1st Edition.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Use python basic concepts to develop problems to solve computational problems.	L3
2. Apply lists, dictionaries, sets and functions in python programming.	L3
3. Experiment module design and text files in python programming	L3
4. Solve problems using object-oriented concepts, elementary data structures in python programming	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A522L.1	-	-	3	3	3	-	-	-	-	-	-	-
19A522L.2	-	-	3	3	3	-	-	-	-	-	-	-
19A522L.3	-	-	3	3	3	-	-	-	-	-	-	-
19A522L.4	-	-	3	3	3	-	-	-	-	-	-	-

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

Title of the Course	Engineering Chemistry Lab
Category	BS
Course Code	19AC24L
Year	I B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Course Objectives:

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

LIST OF EXPERIMENTS

Any TEN of the following experiments must be performed

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. Conduct metric 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 sulphuric acid in lead-acid storage cell
12. Preparation of TiO_2/ZnOnano particles
13. Determination of surface tension of a liquid
14. Preparation of Urea-Formaldehyde resin
15. SEM/TEM analysis of nano materials

Prescribed Text Books

1. Mendham J, Denney RC, Barnes JD, Thomas M and Sivasankar B Vogel's Quantitative Chemical Analysis 6/e, Pearson publishers (2000).
2. N.K Bhasin and Sudha Rani Laboratory Manual on Engineering Chemistry 3/e, Dhanpat Rai Publishing Company (2007).

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Explain the functioning of instruments such as pH meter, conductivity meter and potentiometer.	L2
2. Estimate Zn, Cr, Fe & Cu and other metals in various compounds	L2
3. Determine physical properties of liquids	L4
4. Synthesize and characterize polymers and nano materials using SEM	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC24L.1	3	2	2	-	-	-	-	-	-	-	-	-
19AC24L.2	3	2	2	2	-	-	-	-	-	-	-	-
19AC24L.3	3	2	2	2	-	-	-	-	-	-	-	-
19AC24L.4	3	2	2	2	-	-	-	-	-	-	-	-

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

Title of the Course	Electronic Devices and Circuits Lab
Category	ES
Course Code	19A421L
Year	I B.Tech
Semester	II Semester (Common To EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	2	1

Course Objectives:
- To determine characteristics of JFET, MOSFET, SCR and UJT.
- To determine parameters like gain, impedances and band width of BJT and FET amplifier circuits.

List of the Experiments
1. Identification, Specifications and Testing of Active Devices, Low power JFETs, MOSFETs, Photodiode, Phototransistor, LEDs, SCR and UJT.
2. JFET Characteristics.
3. MOSFET Characteristics
4. Frequency response of CE Amplifier.
5. Frequency response of CB Amplifier.
6. Frequency response of CC Amplifier.
7. Frequency response of Common Source FET Amplifier.
8. V-I Characteristics of LED.
9. SCR Characteristics.
10. UJT Characteristics.
11. Photodiode and Phototransistor Characteristics
12. Soldering Practice.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Gain the knowledge and practical usage of JFET, MOSFET and some special electronic devices.	L1
2. Design the amplifier circuits under given requirements.	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A421L.1	2	2	1	-	-	-	-	-	-	-	-	1	-	-	3
19A421L.2	2	2	1	-	-	-	-	1	-	-	-	1	2	3	-

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

Title of the Course	Partial Differential Equations and Complex Variables
Category	BS
Course Code	19AC31T
Year	II B.Tech
Semester	I Semester
	(Common to CE, ME, EEE, ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To familiarize the transform techniques and complex variables.
- To equip the students to solve application problems in their disciplines

Unit 1 Laplace transforms 9

Laplace transforms of standard functions- First shifting theorem- change of scale property- multiplication by t^n- division by t- transforms of derivatives and integrals- Laplace transform of Periodic functions. (Without proofs)

Unit 2 Inverse Laplace transforms 9

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

Unit 3 Fourier series 9

Fourier series- Dirichlet conditions- functions of any period-odd and even functions - half range series.

Unit 4 Applications of Partial Differential Equations 9

Method of separation of variables- second order partial differential equations- solutions of 1D-wave- 1D-heat and 2D-Laplace equations in Cartesian coordinates

Unit 5 Complex Variables 9

Differentiability-Analyticity -C-R equations (without proof) - harmonic functions- finding harmonic conjugate. Contour integrals- Cauchy's theorem (without proof) - Cauchy's integral formula-Generalized Cauchy's integral formula (without proof).

Prescribed Text Books

B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43/e, 2015.
Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.

Reference Books

1. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9/e, Wiley India, 2009.
2. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India,1995.
3. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7/e, Mc-Graw Hill, 2004.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2008.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Apply the Laplace transformations for different types of functions.	L3
2. Apply the inverse Laplace transformations for different types of functions and solve ordinary differential equations by using Laplace transformation technique.	L3
3. Understand the nature of the Fourier series that represent even and odd functions	L2,
4. Solve the boundary value problems (related to heat, one dimensional wave equation)	L3

5. Apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic and evaluate contour integrals. L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC31T.1	3	2	-	-	-	-	-	-	-	-	-	2
19AC31T.2	3	2	-	-	-	-	-	-	-	-	-	2
19AC31T.3	3	2	-	-	-	-	-	-	-	-	-	2
19AC31T.4	3	2	-	-	-	-	-	-	-	-	-	2
19AC31T.5	3	3	-	-	-	-	-	-	-	-	-	3

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

Title of the Course	Analog Electronics
Category	PC
Course Code	19A231T
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:
- Signal analysis using Op-amp based circuits.
- Applications of Op-amp.
- Functional blocks and the applications of special ICs like Timers, PLL circuits.
- A/D and D/A Converter.

Unit 1 Feedback Amplifiers and Oscillators 8
Advantages of negative feedback – voltage / current, series, Shunt feedback –positive feedback – Condition for oscillations, phase shift – Wien Bridge, Hartley, Colpitts and Crystal oscillators.

Unit 2 Operational Amplifiers 10
Ideal OP-AMP characteristics, Internal Block diagram of op-amp, DC characteristics, AC characteristics, Basic op-amp applications, Instrumentation Amplifier, AC amplifier V/I & I/V converters, Differentiator, Integrator, Log and Antilog Amplifiers

Unit 3 Non Linear Applications of op-amp 9
Comparator, Multivibrators: Astable , Monostable and Schmitt Triggger, Triangle Waveform Generator, Op-amp circuits using Diodes, S/H circuit, Sine wave oscillators.

Unit 4 Filters and PLL 9
RC Active Filters: First order LPF & HPF, Second Order LPF & HPF, Band Pass Filter and Band Reject Filter, All pass Filter, IC 555 Timer and applications, Phase Locked Loop- Phase Detector, VCO, Monolithic PLL, Applications of PLL

Unit 5 D/A And A/D Converters 8
Introduction, Basic DAC Techniques: Weighted Resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Monolithic DAC, A/D Converters: Flash AC, Counter Type ADC, Servo Tracking ADC, Successive Approximation ADC, Dual Slope ADC, DAC/ADC specifications.

Prescribed Text Books:
1. David A. Bell , "Electronic devices and circuits", Oxford University higher education, 5th edition 2008.
2. 2. Sedra and smith, "Microelectronic circuits",7th Ed., Oxford University Press.
3. D. Roy Choudhary, Sheil B. Jani, 'Linear Integrated Circuits', II edition, New Age, 2003.
Reference Books:
1. Ramakant A.Gayakward, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, 2003 / PHI. 2000.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Analyze the characteristics of Op-Amp.	L1, L4
2. Understand the importance of Signal analysis using Op-amp based circuits.	L1, L3
3. Functional blocks and the applications of special ICs like Timers, PLL circuits.	L1, L3
4. Understand and acquire knowledge on the Applications of Op-amp	L1, L3
5. Design and analysis of A/D and D/A Converter.	L1, L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A231T .1	2	3	2	2	1	1	-	-	2	1	-	2	2	-	-
19A231T .2	3	3	2	3	1	1	-	-	2	-	-	2	2	-	-
19A231T .3	2	2	2	1	1	-	-	-	2	-	-	2	2	-	-
19A231T .4	3	2	1	2	1	-	-	-	2	-	-	2	2	-	-
19A231T .5	2	3	3	2	2	1	-	-	2	1	-	2	2	-	-

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

Title of the Course	Circuit Theory
Category	PC
Course Code	19A232T
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context
- Provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.
- Impart basic knowledge of the magnetic Circuits

Unit 1 Basic Concepts of Electrical Circuits 9

Voltage-Current Relationship for Passive Elements, Star-Delta Transformations, Voltage and Current division rules, Mesh, Super Mesh, Nodal and Super Node analysis

Unit 2 Fundamentals Of 1-Φ AC Circuits 9

Advantages of AC supply, Types of AC waveforms, Importance of Sine Wave, Basic definitions-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. Resonance – Definition, Resonant frequency, bandwidth and Q-factor for series and parallel resonant circuits, Problems.

Unit 3 Three Phase Circuits 10

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.

Unit 4 Network Theorems 10

Superposition-Thevenin's-Norton's-Maximum Power Transfer Theorem for AC Excitation, Millman's-Reciprocity-Substitution-Compensation and Tellegen's Theorems for DC and AC excitations and Dependent Sources.

Unit 5 : Magnetically Coupled Circuits & Network Topology 8

Coupled circuits – self & mutual inductance, Dot convention, Coefficient of coupling-Analysis of Coupled Circuits
Network Topology: Basic Definitions- Graph- Tree, Incidence Matrix, Basic Cutset and Basic Tieset Matrices for Planar Networks –Problems.
Duality & Dual Networks-Problems.

Prescribed Text Books:

1. A. 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 2015.
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:

Student will be able to	Blooms Level of Learning
1. Analyze electrical Circuits using network Reduction Techniques, Loop Analysis and Nodal Analysis.	L3
2. Analyze Single Phase AC Electrical Circuits	L3
3. Analyze 3-phase electrical circuits.	L3
4. Solve Electrical circuits using Theorems.	L3
5. Solve the Coupled Circuits.	L3
6. Apply concepts of electric network topology to solve electrical circuits.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A232T.1	3	3	3	-	-	-	-	-	-	-	-	-	3	-
19A232T.2	3	3	3	-	-	-	-	-	-	-	-	-	3	-
19A232T.3	3	3	3	-	-	-	-	-	-	-	-	-	3	-
19A232T.4	3	3	3	-	-	-	-	-	-	-	-	-	3	-
19A232T.5	3	3	3	-	-	-	-	-	-	-	-	-	3	-
19A232T.6	3	3	3	-	-	-	-	-	-	-	-	-	3	-

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

Title of the Course	Electrical Machines-I
Category	PC
Course Code	19A233T
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives: This course will useful to the students to

- Understand the dc machine construction and operation.
- Characteristics of dc generators.
- Characteristics and speed control methods of dc motor.
- Construction and operation of single phase transformer.
- Differences between two winding transformer and auto transformer, poly phase transformers parallel operation.

Unit 1 Construction and Armature Reaction Of A DC Machine 8

DC Machines Constructional details, Principle of Operation as a generator and motor, armature windings-simplex lap and wave windings, EMF equation. Armature reaction and its effects – cross magnetizing and Demagnetizing AT/pole, Methods of improving commutation, numerical problems.

Unit 2 Types of DC Generators and Their Characteristics 9

Methods of excitation – separately excited and self-excited generators, buildup of EMF and causes for failure, open circuit characteristics – critical field resistance and critical speed, characteristics of separately excited and self-excited generators, numerical problems.

Unit 3 DC Motor Characteristics, Speed Control and Testing 8

Back emf, starters, torque equation, characteristics of dc motors, various applications of dc motor. Losses–constant and variable losses, efficiency, Speed control of dc motors-armature control, flux control, numerical problems
Testing of DC Machines
Direct (brake test), indirect (Swinburne 's test) and regenerative testing (Hopkinson's'test), Field's test, Retardation test, numerical problems.

Unit 4 Single Phase Transformers and its Testing 10

Construction, Operation on no-load and load, Equivalent circuit, phasor diagrams. Losses and efficiency, Regulation, Effect of variations of frequency & supply voltage on Iron losses.Testing of transformers -Open circuit and short circuit tests, Sumpner 's test, separation of losses test-numerical problems.

Unit 5 Parallel Operation of Transformers, Autotransformers And Poly Phase Transformers. 10

Parallel operation of single transformers. Autotransformers- equivalent circuit- comparison with two-winding transformers numerical problems.
Poly-phase Transformers -Poly-phase transformer connections, third harmonics in phase voltages, tertiary windings, Scott connection, numerical problems.

Prescribed Text Books:

1. P.S. Bimbhra (2009) —Electrical machinery, 7th Edition, Khanna Publishers.
2. I.J. Nagrath & D.P. Kothari, (2004), —Electric MachinesII, 3rd Edition, Tata McGraw-Hill Publishers.
3. A.E. Fitzgerald, C. Kingsley and S. Umans ,—Electric MachineryII, 6th Edition, Tata McGraw-Hill Companies, 2003

Reference Books:

1. H. Cotton, -Electrical Technology, 7th Edition, CBS Publishers, 2003.
2. Mukherjee and Chakravarthy, -Electrical Machines, 2nd Edition, Dhanpat Rai Publishers, 2001.

3. Ashfaq Hussain, ―Electrical MachinesII Second Edition, Dhanpat Rai Publishers.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand the constructional aspects, operation and armature reaction of dc machine working of as a motor and generator.	L2
2. Analyze the performance characteristics of dc generator	L4
3. Analyze the methods of speed control, testing of DC motor and its characteristics.	L4
4. Understand the operation of a single-phase transformer and its testing.	L2
5. Understand the differences between auto transformer, two winding transformer and poly phase transformers.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A233T.1	1	1	-	1	-	-	-	-	-	-	-	1	-	-
19A233T.2	2	2	-	2	2	2	-	-	-	-	-	2	-	-
19A233T.3	2	2	2	2	2	2	-	-	-	-	-	2	-	-
19A233T.4	1	1	1	1	-	-	-	-	-	-	-	1	-	-
19A233T.5	1	1	-	1	-	-	-	-	-	-	-	1	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Switching Theory and Logic Design
Category	PC
Course Code	19A234T
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To understand the concepts and techniques associated with the number systems and codes
- To minimize the logical expressions using Boolean postulates
- To design various combinational and sequential circuits.

Unit 1 Number Systems, Codes & Boolean Algebra 9

Philosophy of number systems – r, (r-1)'s complement, representation of negative numbers, Binary arithmetic, Binary codes, Error detecting &Error correcting codes, hamming code.
Boolean Algebra: Fundamental postulates of Boolean algebra, Basic theorems and Properties, Logic gates, Properties of XOR gate, universal gates.

Unit 2 Switching Functions and Their Minimization 8

Switching Functions-Canonical and Standard forms, Algebraic simplification using Boolean theorems, two level & Multilevel Realization of Boolean Functions using Universal Gates.
Minimization: K-Map methods, Prime implicants, don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime-Implicant chart, simplification rules.

Unit 3 Combinational Logic Design & Programmable Logic Devices: 10

Design using conventional logic gates-Binary Adders, Subtractors, Ripple Adder, Look Ahead carry adder, Magnitude comparator, Encoder, Decoder, Multiplexer, De-Multiplexer, Code-converters.
PLD's: ROM, PROM, PLA, PAL, and Realization of Switching functions using PLD's. Comparison between PLA, PAL, ROM.

Unit 4 Sequential Circuits 8

Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples),Basic flip-flops, Triggering and excitation tables, flip flop conversions, Steps in synchronous sequential circuit design, Design of modulo-N Synchronous counters – up/down counter, ring counter, Johnson counter.

Unit 5 FSM Minimization and ASM Charts 10

Finite state machine-capabilities and limitations, Mealy and Moore models and their conversions, minimization of completely specified sequential machines, Partition technique.
Algorithmic State Machines: Salient features of the ASM chart.

Prescribed Text Books:

1. M.Morris Mano, Digital Design. Pearson,5th Ed,2013.
2. A.Anand Kumar, Switching Theory and Logic Design.3rd Edition, PHI Learning Pvt. Ltd., 2016.

Reference Books:

1. ZviKohavi, Switching& Finite Automata Theory. TMH, 2nd Edition,2008.
2. Charles H. Roth,Jr, Larry L.Kinney.Fundamentals of Logic Design. Cengage Learning, 2015, 6th Ed.
3. William I. Fletcher, An Engineering Approach to Digital Design. Pearson, 3rd Ed, 2015.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Analyze the number systems and codes.	L4
2. Simplify the logics expressions using Boolean laws and postulates.	L1
3. Minimize the logic expressions using map method and tabular method.	L3
4. Design combinational logic circuits using conventional logic gates and various programmable logic devices.	L5
5. Design sequential logic circuits and Finite state machines.	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A234T.1	2	2	2	-	2	2	-	-	-	-	-	2	2	2
19A234T.2	3	3	3	-	3	-	-	-	-	-	-	3	3	3
19A234T.3	3	3	3	-	3	3	-	-	-	-	-	3	3	3
19A234T.4	3	3	3	3	3	3	-	-	-	-	-	3	3	3
19A234T.5	3	3	3	3	-	-	-	-	-	-	-	3	3	3

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

Title of the Course	Fluid Mechanics and Hydraulic Machinery
Category	ES
Course Code	19A337T
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
2	1	-	3

Course Objectives:

- To give insight knowledge on fluid statics and kinematics
- To gain knowledge on fluid dynamics
- To give basic understanding of Hydro Electric power plant and importance of impact of jets
- To become familiar about different types of turbines and able to analyze the performance characteristics of various turbines.
- To be able to understand the working of power absorbing devices like pumps and able to analyze their performance characteristics.

Unit 1 Fluid Statics 7

Dimensions and units: physical properties of fluids- specific gravity, viscosity, surface tension- vapour pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure Piezometer, U-tube and differential manometers – Buoyancy, meta-centre, metacentre height, condition of equilibrium height of a floating and submerged bodies.

FLUID KINEMATICS: Stream line, path line, streak lines and stream tube, classification of flows-steady & unsteady, uniform & non uniform, laminar & turbulent, rotational & irrotational flows. Equation of continuity for one dimensional flow

Unit 2 Fluid Dynamics 7

Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend. CLOSED CONDUIT FLOW: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: Pitot tube, venture meter and orifice meter.

Unit 3 Hydroelectric Power Stations 10

Elements of hydro electric power station-types. Concept of pumped storage plants- storage requirements. BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

Unit 4 Hydraulic Turbines 12

Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design –draft tube theory- functions and efficiency. PERFORMANCE OF HYDRAULIC TURBINES: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

Unit 5 Centrifugal Pumps 7

Classification, working, work done – manometric headlosses and efficiencies specific speed- pumps in series and parallel-performance - characteristic curves, NPSH. RECIPROCATING PUMPS:Working, Discharge, slip, indicator diagrams.

Prescribed Text Books:

1. Fluid Mechanics and Hydraulic machines by Dr. R.K.Bansal
2. Hydraulics and Fluid Mechanics including Hydraulic Machines by Dr. P.N.Modi and Dr. S.M.Seth

Reference Books:

1. D.S. Kumar, Fluid Mechanics and Fluid Power Engineering.Kotaria & Sons – 2013 edition.
2. D. Rama Durgaiah, Fluid Mechanics and Machinery. New Age International, 1st edition – 2002
3. Banga& Sharma, Hydraulic Machines.Khanna Publishers.
4. James W. Dally, William E. Riley, Instrumentation for Engineering Measurements. John Wiley & Sons Inc, 2nd edition – 2010.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Gain the knowledge on fluid mechanics fundamentals like fluid statics and fluid kinematics	L1,L2
2. Have basic idea about the fundamental equations used in Fluid Dynamics and are able to apply these concepts in real working environment	L2,L3
3. Study the fundamentals of turbo machinery and elements of hydroelectric power plant	L2,L3
4. Measure the performance of the different types of Hydraulic Turbines	L2,L3,L4
5. Calculate the performance of the different types of Hydraulic Pump	L2,L3,L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A337T.1	3	3	3	-	3	-	3	-	-	-	-	-
19A337T.2	3	3	3	-	3	-	3	-	-	-	-	-
19A337T.3	3	3	3	3	-	3	3	-	-	1	-	-
19A337T.4	3	3	3	3	3	3	3	-	2	-	-	-
19A337T.5	3	3	3	3	3	3	3	-	2	-	-	-

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

Title of the Course	Essence of Indian Traditional Knowledge
Category	MC
Course Code	19AC35T
Year	II B.Tech
Semester	I Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	0

Course Objectives:

- To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system
- To understand the legal framework and traditional knowledge and biological diversity act 2002 and geographical indication act 2003.
- To focus on traditional knowledge and intellectual property mechanism of traditional knowledge and protection

Unit 1 9

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems.

Unit 2 9

Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

Unit 3 9

Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK, Protection, value of TK in global economy, Role of Government to harness TK.

Unit 4 9

Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

Unit 5 9

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Prescribed Text Books

1. Traditional Knowledge System in India, by Amit Jha, 2009.

Reference Books

1. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012
2. Knowledge Traditions and Practices of India, Kapil Kapoor, Michel Danino

e-resources: https://www.youtube.com/watch?v=LZP1StpYEPM

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand the concept of Traditional knowledge and its importance	L2
2. Understand the need and importance of protecting traditional knowledge and apply it in daily lives	L2
3. Apply various enactments related to the protection of traditional knowledge.	L1
4. Understand the concepts of Intellectual property to protect the traditional knowledge	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC35T.1	-	-	-	-	-	-	-	-	-	-	-	3
19AC35T.2	-	-	-	-	-	-	-	-	-	-	-	3
19AC35T.3	-	-	-	-	-	-	-	-	-	-	-	3
19AC35T.4	-	-	-	-	-	-	-	-	-	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Fluid Mechanics and Hydraulic Machinery Lab
Category	ES
Course Code	19A337L
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	2	1

Course Objectives:

- To provide knowledge in verifying Bernoulli's Theorem.
- To impart knowledge in Fluid flow devices like Venturi meter & Orifice meter
- To understand frictional losses in pipes with various diameters.
- To acquire knowledge about various hydraulic Machines like Centrifugal pump, Reciprocating pump, Pelton Turbine, Kaplan Turbine, Francis Turbine etc.
- To understand impact of jet on vanes like Flat vane & semi-circular vane
- To develop the students in learning the various principles of Fluid Mechanics & Hydraulic Machines, so that they can characterize, transform and use the knowledge gained in solving the various related Engineering problems.

LIST OF EXPERIMENTS Practice hours: 20

1. Impact of jet on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Turbine flow meter.
13. Verification of Bernoulli's theorem.

Note: Any 10 of the above 13 experiments are to be conducted.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Verify the Bernoulli's Theorem	L3
2. Measure the flow rate of fluids by the instruments like Venturimeter and Orifice meter.	L3
3. Analyze the frictional losses and discharge in pipes.	L3
4. Analyze impact of jet on vanes like Flat vane & Semi circular vane.	L3
5. Conduct experiments, analyze the data and interpret results of hydraulic machineries.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A337L.1	3	-	2	-	-	-	-	-	-	-	-	-
19A337L.2	2	1			-	-	-	-	-	-	-	-
19A337L.3	2	1	1	-	-	-	-	-	-	-	-	-
19A337L.4	2	1	2	-	-	-	-	-	-	-	-	-
19A337L.5	3	2	3	2	-	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Analog Electronics Lab
Category	PC
Course Code	19A231L
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	2	1

Course Objectives:

- Aims to make the students be able to design electronic circuits
- To understand the analysis of transistor-based amplifiers
- To generate different types of non-sinusoidal signals
- To verify the applications of Op-Amp

Perform the following experiments

1. Feedback amplifier (Current Series & Voltage Series)
2. Linear wave shaping
3. Class A power amplifier
4. Class B power amplifier
5. Non-linear wave shaping –Clippers
6. Non-linear wave shaping- Clampers
7. Op-Amp applications- adder and subtractor circuits
8. Active filter applications- LPF, HPF (first order)
9. Function generator using Op-Amps
10. IC-555 timer- Monostable and Astable Operation circuit
11. 4-Bit DAC using Op-Amp

Prescribed Text Books:

1. David A. Bell ,"Electronic devices and circuits", Oxford University higher education, 5th edition 2008. 2. Sedra and smith, "Microelectronic circuits",7th Ed., Oxford University Press
2. D. Roy Choudhary, Sheil B. Jani, 'Linear Integrated Circuits', II edition, New Age, 2003.

Reference Books:

1. RamakantA.Gayakward, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, 2003 / PHI. 2000.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Analyze the characteristics of Op-Amp.	L4
2. Understand the importance of Signal analysis using Op-amp based circuits.	L3
3. Functional blocks and the applications of special ICs like Timers, PLL circuits.	L3
4. Understand and acquire knowledge on the Applications of Op-amp	L3
5. Ability to design and analysis of A/D and D/A Converter.	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A231L.1	2	3	2	2	2	-	-	2	-	-	-	-	3	-
19A231L.2	2	3	2	-	3	-	-	2	-	1	-	-	2	-
19A231L.3	2	1	1	-	2	-	-	-	-	1	-	-	2	1
19A231L.4	2	3	3	2	2	-	-	-	2	-	-	-	2	-
19A231L.5	2	3	2	2	-	-	-	2	-	-	-	-	2	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Electrical Machines –I Lab
Category	PC
Course Code	19A233L
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	2	1

Course Objectives:

- Speed control and performance characteristics of DC Machines; determination of losses in a DC machine.

List of Experiments
Perform any ten in the following Experiments
1. Magnetization characteristic of DC shunt generator.
2. Load test on DC shunt generator.
3. Load test on DC series generator.
4. Load test on DC compound generator (cumulative and differential connections).
5. Hopkinson's test.
6. Field's test.
7. Swinburne's test.
8. Speed control of DC shunt motor.
9. Brake test on DC compound motor.
10. Brake test on DC shunt motor.
11. Brake test on DC series motor.
12. Separation of losses in DC shunt machine.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Identify various parts of DC machine and different types of Starters.	L1
2. Analyze the performance of various DC machines.	L4
3. Design the experimental circuit based on loading and rating of The DC machine.	L4
4. Demonstrate skills in • Obtaining various characteristics of DC machines. • Determining the performance of DC machines. • Determining and separating losses in DC machines.	L3
5. Function effectively as individual and as member in a team.	L4
6. Communicate effectively both oral and written.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A233L.1	3	-	-	-	-	-	-	-	-	-	-	-	3	-
19A233L.2	2	3	-	-	-	-	-	-	-	-	-	-	3	-
19A233L.3	1	2	3	-	-	-	-	-	-	-	-	-	3	-
19A233L.4	2	2	2	3	-	-	-	-	-	-	-	-	-	3
19A233L.5	1	2	-	-	3	-	-	-	-	-	-	-	-	3
19A233L.6	1	-	-	-	-	3	-	-	-	-	-	-	-	

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

Title of the Course	Numerical Methods and Transform Techniques
Category	BS
Course Code	19AC42T
Year	II B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To familiarize the students with numerical methods of solving.
- To familiarize the complex variables and transform techniques.

Unit 1 Solutions of algebraic, transcendental equations and Interpolation 9

Solutions of algebraic and transcendental equations: Bisection method – Regular Falsi method and Newton-Raphson method. Interpolation: Finite differences - forward differences and backward differences - Newton's forward interpolation formula and Newton's backward interpolation formula - Lagrange's interpolation formula.

Unit 2 Numerical Differentiation and Numerical Solutions of ordinary differential equations of first order 9

Numerical Differentiation: Numerical integration- Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.
Numerical Solutions of ordinary differential equations of first order: Taylor's series, Modified Euler's method - Runge-Kutta method of fourth order.

Unit 3 Complex Power Series and Residues 9

Complex variables-Taylor's series - zeros of analytic functions – singularities - Laurent's series - Residues- Cauchy residue theorem (without proofs).

Unit 4 Fourier Transforms 9

Fourier integrals - Fourier cosine and sine integrals - Fourier transform - sine and cosine transform – properties.

Unit 5 Z-Transforms 9

Definition of Z-transform - elementary properties - linearity property - damping rule - shifting u_n to the right and left - multiplication by n - initial value theorem - final value theorem - inverse Z-transform - convolution

Prescribed Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43/e, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.

Reference Books

1. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9/e, Wiley
2. India, 2009.
3. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
4. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7/e, McGraw Hill, 2004.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2008.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Apply the knowledge of numerical methods to solve algebraic and transcendental equations and acquire the knowledge of interpretation.	L3
2. Understand the technics of numerical differentiation, Integration and numerical solution of ordinary differential equations.	L2
3. Evaluate the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues.	L3
4. Apply the knowledge of Fourier Integrals and Fourier transformation to solve differential equations.	L3
5. Develop Z-transforms Techniques for discrete time systems.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC42T.1	3	3	-	-	-	-	-	-	-	-	-	3
19AC42T.2	3	3	-	-	-	-	-	-	-	-	-	2
19AC42T.3	3	3	-	-	-	-	-	-	-	-	-	2
19AC42T.4	3	3	-	-	-	-	-	-	-	-	-	3
19AC42T.5	3	3	-	-	-	-	-	-	-	-	-	2

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

Title of the Course	Electrical Machines -II
Category	PC
Course Code	19A241T
Year	II B.Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To impart knowledge on construction and operational aspects of various types of Induction machines & Synchronous Machines, single phase machines & Special machines.
- To develop skills in analyzing and evaluating the operation and performance of Induction machines, Synchronous Machines, single phase machines & Special machines for various operating conditions.
- To inculcate attitude of applying the conceptual knowledge of Induction machines, Synchronous Machines, single phase machines & Special machines to meet the societal needs.

Unit 1 Basics of Three phase rotating machines & 3-phase induction motor 10

Basics of Three phase rotating machines: Constructional features, principle of working of 3-phase induction motor and synchronous machine, Armature windings, integral slot and fractional slot windings, Distributed, concentrated and chorded windings, distribution, pitch and windings factors.

3-phase induction motor: Rotor input, losses and power flow diagram, torque equation, expressions for maximum torque and starting torque, torque - slip characteristics, crawling and cogging, double-cage and deep-bar rotors, circle diagram & predetermination of performance, numerical problems.

Unit 2 Starting of three phase induction motor & Speed control of Induction motors 10

Starting of three phase induction motor :Starting methods: direct online starting, stator reactor starting, autotransformer starting, star-delta starting and starting current and starting torque calculations, numerical problems.

Speed control of Induction motors: Speed control – change of frequency, change of poles– cascade connections, rotor resistance method, injection of an emf into rotor circuit (qualitative treatment only), induction generator (qualitative treatment only), numerical problems

Unit 3 1-phase Induction motors 8

1-phase Induction motors: Principle of working, determination of equivalent circuit parameters – numerical problems. Starting methods and types - split-phase induction motors, capacitor motors, capacitor start motors, two value capacitor motors, permanent split capacitor (PSC) motor, and shaded pole induction motor.

Unit 4 Synchronous Machines & Regulation of Alternators 8

Synchronous Machines: EMF equation, Harmonics in generated emf, slot harmonics and suppression of harmonics, Armature reaction, numerical problems.

Regulation of Alternators: Regulation of Alternators: Regulation of alternator by synchronous impedance method, M.M.F. method and Z.P.F method, two reaction analysis, experimental determination of X_d and X_q, phasor diagrams, regulation of salient pole alternators, numerical problems.

Unit 5 Parallel operation of Alternators & Synchronous motors 9

Parallel operation of Alternators: Synchronization of alternators with infinite bus bars, synchronizing power, parallel operation and load sharing, effect of change of excitation and mechanical power input, numerical problems.

Synchronous motors: Theory of operation, phasor diagram, synchronous condenser, numerical problems. Hunting and its suppression, methods of starting, numerical problems.

Prescribed Text Books:

1. P.S. Bimbhra, ―Electrical machinery, 7th Edition, Khanna Publishers, 2011.
2. I.J. Nagrath& D.P. Kothari, ―Electric Machines,5th Edition, Tata McGrawhill Publishers,2017.
3. A.E. Fitzgerald, C. Kingsley and S. Umans , ―Electric Machinery, 6th Edition, Tata McGrawHill Companies, 2003.
4. P.S. Bimbhra, ―Generalized Theory of Electrical machinesǁ, 6th Edition, Khanna Publishers, 2002.

Reference Books:

1. H. Cotton, ―Electrical Technologyǁ, 7th Edition, CBS Publishers, 2003
2. Mukherjee and Chakravarthy, ―Electrical Machinesǁ, 2nd Edition, Dhanpat Rai Publishers,2001.
3. Ashfaq Hussain, ―Electrical Machinesǁ Second Edition, Dhanpat Rai Publishers.
4. M. G. Say, ― The Performance and Design of Alternating Current Machinesǁ, CBS Publishers & Distributers PVT. Ltd., New Delhi, 2005.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Demonstrate knowledge on • Construction, operation of Induction machines, Synchronous machine, fractional kilowatt motors.. • Characteristics of induction motors. • Starting and speed control of induction motors. • Armature reaction, regulation and synchronization of alternator. • Starting methods of synchronous motor. • Parallel operation of alternators.	L1
2. Analyze the operation and performance of Induction machines, synchronous and single phase machines for various operating conditions.	L4
3. Design suitable accessories / techniques for the starting and speed control of induction motors.	L3
4. Solve engineering problems pertaining for induction machines synchronous machines and fractional kW motors to provide feasible solutions.	L3
5. Select appropriate techniques and tools for desired operation of induction machines, of synchronous and fractional kW machines in domestic, agriculture and industrial applications.	L4
6. Apply the conceptual knowledge of Induction Machines, synchronous machines, fractional kW motors in relevance to industry and society.	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A241T.1	3	-	-	-	-	-	-	-	-	-	-	3	3	-
19A241T.2	2	3	-	-	-	-	-	-	-	-	-	3	3	-
19A241T.3	1	2	3	-	-	-	-	-	-	-	-	2	3	-
19A241T.4	2	2	2	3	-	-	-	-	-	-	-	1	-	3
19A241T.5	1	2	-	-	3	-	-	-	-	-	-	2	-	3
19A241T.6	1	-	-	-	-	3	-	-	-	-	-	1	-	-

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

Title of the Course	Electromagnetic Fields
Category	PC
Course Code	19A242T
Year	II B.Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To provide the basic skills required to understand, develop, and design various engineering applications involving electromagnetic fields.

Unit 1 Electrostatics-I 10

Electrostatic fields-Coulomb's law - Electric Field Intensity (EFI) - Various Charge Distributions - EFI due to a Continuous charge distributions- Infinite line and Infinite surface charge- Electric Flux density-Gauss's Law - Applications of Gauss law to symmetrical charge distributions(Point, Infinite line and Infinite surface Distributions) and differential volume element - Maxwell's first equation. Energy expended in moving a point charge in an electric field-Potential –Maxwell's second equation

Unit 2 Electrostatics-II 10

Potential Gradient-Potential for different Charge distributions-energy density in electrostatic fields Electric Dipole-Dipole moment - potential and EFI due to an electrical Dipole-Torque on an Electric Dipole in an electric field-Current density - conduction and convection current density - Polarization , Boundary Conditions Capacitance-capacitance of parallel plate, Spherical and Co-axial capacitors with composite dielectric Laplace's and Poisson's equations.

Unit 3 Magnetostatics-I 10

Static magnetic fields-Biot-Savart's law, Magnetic Field Intensity(MFI) - MFI due to a straight current carrying filament, Circular, Solenoid current carrying wire, Relation between magnetic flux, Magnetic flux density and MFI. Ampere's Circuital law - Maxwell's third equation- Applications of Ampere's law to infinite line current, Infinite sheet of current, Infinitely long co-axial transmission line, Scalar magnetic potential and its limitations-Vector magnetic potential, Maxwell's fourth equation.

Unit 4 Magnetostatics-II 10

Magnetic Forces- Force on moving charges, - Lorentz force equation, Force on a current element -Force on a straight and long current carrying conductor in magnetic field-Force between two straight long and parallel current carrying conductors. Magnetic Dipole and Dipole moment - Torque on a current loop placed in a magnetic field. -Magnetization - Self-Inductance of a solenoid, Co-axial cable, energy stored and density in magnetic field.

Unit 5 Electrodynamic Fields 9

Time varying fields - Faraday's laws of electromagnetic induction -statically and dynamically induced EMF – simple problems. Modifications of Maxwell's equations for time varying fields(Point forms and Integral forms) - displacement current - pointing theorem and pointing vector

Prescribed Text Books:

1. Matthew N.O. Sadiku. Principles of Electromagnetic Fields. 6thedition, Oxford Publications, Jan' 2018
2. William H. Hayt& John A. Buck. Engineering Electromagnetics. 8th Edition, Mc. Graw Hill Companies, Sep'2017.

Reference Books:

1. Joseph A .Edminister ,Theory and problems of Electromagnetics 4th Edition ,Schaum's Outline series Mc.Graw Hill companies ,New Delhi,2009.
2. A. Gangadhar& P.M. Ramanathan. Field Theory. 5th edition, Khanna publishers, New Delhi, 2008.
3. Ashutosh Pramanik. Electromagnetism ,Problems with solutions. 3rd Edition.PHI

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Analyze the different aspects related to Static Electric Fields and corresponding Maxwell's equations.	L3
2. Understand the significance of Polarization and Capacitance in Static Electric Fields.	L1
3. Analyze the different aspects related to Static Magnetic Fields and corresponding Maxwell's equations.	L3
4. Learns the significance of Magnetization and Inductance in Static Magnetic Fields.	L1
5. Demonstrate the physical significance of Time Varying Electromagnetic Fields through corresponding Maxwell's equations.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A242T .1	3	3	-	-	-	-	-	-	-	-	-	-	1	-
19A242T .2	3	3	-	-	-	-	-	-	-	-	-	-	1	-
19A242T .3	3	3	-	-	-	-	-	-	-	-	-	-	1	-
19A242T .4	3	3	-	-	-	-	3	-	-	-	-	-	-	1
19A242T .5	2	2	-	-	-	-	-	-	-	-	-	-	-	1

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

Title of the Course	Generation and Transmission of Electric Power
Category	PC
Course Code	19A243T
Year	II B.Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- Understand the operation of conventional power plants.
- Understand the electrical design of transmission lines.
- Evaluate the performances of transmission lines.
- Understand the mechanical design of transmission lines.
- Understand the basic concepts of distribution system and underground cables.

Unit 1 Conventional Power Generation Plants 9

Line diagrams of Thermal Power Station, Hydro power station, Gas and nuclear Power stations. Advantages and disadvantages of the plants. Types of Nuclear reactors and brief description of PWR, BWR and FBR.

Unit 2 Transmission Line Parameters 10

Electrical design of Overhead Transmission Lines – Calculation of Line constants of 1- phase, 3-phase system of symmetrical, unsymmetrical and transposed configurations –Calculation of Line constants of stranded conductor, double circuit 3-phase system using GMD and GMR Concepts.

Unit 3 Performance of Transmission Lines 10

Classification of Transmission Lines -Short, medium and long line and their model representations - Nominal-T, Nominal-π and A, B, C, D Constants for symmetrical networks, Numerical Problems and solutions for estimating regulation and efficiency of all types of lines. – Numerical Problems.

Unit 4 Performance of Factors affecting the Transmission line 8

Skin and Proximity effects, Ferranti effect, Charging Current - Corona - factors affecting corona, critical voltages and power loss.

Overhead Line Insulators, Types of Insulators, String efficiency and Methods for improvement, voltage distribution, calculation of string efficiency, Numerical Problems.

Sag and Tension Calculations: Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Stringing chart, Numerical Problems.

Unit 5 Underground Cables 9

Types of Cables, Construction, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables, Capacitance grading, Inter-sheath grading, Numerical Problems.

Prescribed Text Books:

1. M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, -A Text Book on Power System Engineeringǁ, Dhanpat Rai & Co Pvt. Ltd. 1999.
2. C.L.Wadhwa, -Electrical Power Systemsǁ, New Age International (P) Limited, Publishers, 1998.
3. V.K Mehta and Rohit Mehta (2004), -Principles of Power Systemsǁ, S.Chand & Company, New Delhi.
4. Dr.B.R.Gupta , -Generation of Electric Energyǁ, 6th edition, 2008, S.Chand Publisher.

Reference Books:

1. John J Grainger William D Stevenson, ―Power system Analysisǁ, TMC Companies, 4th edition, 2004
2. Hadi Saadat, ―Power System Analysisǁ, TMH Edition. 2002.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Describe the different types of conventional power generation plants.	L1
2. Demonstrate knowledge on transmission line parameters and configurations.	L2
3. Analyze the voltage drop, power loss and efficiency in transmission systems.	L4
4. Identify appropriate model for transmission system while exercising modeling and planning of power system.	L3
5. Evaluate parameters for transmission lines and underground cables.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A243T .1	-	-	3	-	-	3	3	-	-	-	-	-	-	3
19A243T .2	3	3	2	-	-	-	-	-	-	-	-	2	3	2
19A243T .3	3	3	-	1	-	2	-	-	-	-	-	2	3	
19A243T .4	3	3	2	-	2	2	1	-	-	-	-	2	3	2
19A243T .5	3	3	2	-	2	2	1	-	-	-	-	2	3	2

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

Title of the Course	Linear Control Systems
Category	PC
Course Code	19A244T
Year	II B.Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:
To provide an introduction to the analysis of linear control systems. This will permit an engineer to exploit time domain and frequency domain tools.

Unit 1 Introduction 10
Concepts of Control Systems- Open Loop and closed loop control systems Examples, Effects of feedback-Mathematical models-differential Equations-Transfer Function-Mechanical Translational & Rotational systems, Electrical analogy — Block Diagram representation of systems - Block diagram algebra, Signal Flow graph and Mason's gain formula. Transfer function of DC servo motor – AC servo motor-Synchro transmitter and receiver.

Unit 2 Time Response Analysis 8
Types of test signals, Type and Order of a systems, Time Response of first-second order system, Time domain specifications- and– steady state error – static error constants – generalized error coefficients, Effects of proportional, integral, derivative Controllers.

Unit 3 Stability Analysis in Time Domain 9
Concepts of stability- BIBO Stability, Characteristic equation, location of roots in s-plane for stability, Routh-Hurwitz stability criterion- Root locus concept - construction of root locus.

Unit 4 Frequency Response Analysis 9
Introduction, Frequency domain specifications-Bode Diagrams, Stability Analysis from Bode Plots, Stability analysis from Polar plots, Stability analysis from Nyquist plots.

Unit 5 Compensation Techniques & State Space Analysis 9
Compensation techniques – Lag, Lead, Lead-Lag Compensators design using Bode Plot
Concepts of state, state variables and state model, obtaining of state model from physical systems and transfer function, obtaining transfer function from state space, State Transition Matrix and its properties–Determination of controllability and Observability using Kalman's test

Prescribed Text Books:

1. Katsuhiko Ogata "Modern Control Engineering" — Prentice Hall of India Pvt. Ltd., 5th edition,2010
2. I.J.Nagrath and M. Gopal "Control Systems Engineering" New Age International (P) Limited, Publishers, 5th edition,2007.

Reference Books:

1. Control Systems Engineering - by NISE 5th Edition – John Wiley& sons, 2010.
2. Control Systems –by A. NagoorKani– First Edition RBA Publications, 2006.
3. Automatic Control Systems– by B. C. Kuo and Farid Golnaraghi John Wiley and sons, 8th edition,2003.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand the basic components of control systems.	L2
2. Gain knowledge in various time domain and frequency domain tools for analysis and design of linear control systems and compensators.	L1
3. Understand the methods to analyze the stability of systems from transfer function forms.	L2
4. Understand the concept of state variable analysis.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A244T.1	2	2	2	-	2	-	-	-	-	-	-	-	3	-
19A244T.2	3	3	3	-	2	-	-	-	-	-	3	3	3	3
19A244T.3	1	1	1	-	2	-	-	-	-	-	-	-	3	-
19A244T.4	1	1	1	-	2	-	-	-	-	-	3	3	3	-

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

Title of the Course	Network Analysis and Synthesis
Category	PC
Course Code	19A245T
Year	II B.Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:
This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of two port network, transient analysis, applications of Laplace and Fourier transforms, network function and network synthesis techniques etc.

Unit 1 Two Port Networks 8
Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters and Their Relations, Condition for Reciprocity and Symmetry-inter connections- Two Port Network Parameters using Transformed Variables.

Unit 2 Laplace Transforms 9
Definition of Laplace transform – advantages - Laplace transform of standard and Delay functions –properties of Laplace transforms– inverse Laplace transform - application of Laplace transform to series RL, RC, RLC circuits – initial and final value theorem

Unit 3 Transient Analysis (AC & DC) 9
DC Transient response of RL, RC and RLC series circuits –Initial Conditions- Response of RL, RC and RLC series circuits with AC excitation

Unit 4 Fourier Series & Fourier Transforms 9
Introduction- trigonometric Fourier series - evaluation of Fourier coefficients – waveform symmetry, exponential form of Fourier series, effective value, Fourier transforms & Properties.

Unit 5 Network Functions and Synthesis 10
Network functions- necessary conditions for driving point function-necessary conditions for transfer function – Hurwitz polynomials – positive Real functions - definitions and properties - synthesis of single port networks (RL, RC and LC networks).

Prescribed Text Books:
1. A. Sudhakar & Shyam Mohan s Palli. Circuits and Networks 5th Edition, Tata McGraw Edition (India) Private Limited, 2015.
2. D. Roy Choudhury. Networks and Systems. 1st edition, New Age international publishers
Reference Books:
1. A.Chakrabarthi. Circuit Theory (Analysis and Synthesis). 1st edition
2. M.E. Van Valkenburg. Network analysis. 3rd edition
3. William H Hayt Jr. Jack E. Kemmerly, Steven M. Durbin. Engineering Circuit Analysis. 6th edition, Tata Mcgraw Hill publishing company Ltd.,
4. Umesh Sinha. Network Analysis and Synthesis. 5th edition, Satyaprakashan, New Delhi.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Calculate two port Network parameters.	L3
2. Analyze the electrical circuits using Laplace Transforms.	L3
3. Analyze the transient response of electrical circuits for DC and AC excitations.	L3
4. Analyze the electrical circuits using Fourier series and Fourier transforms.	L3
5. Synthesize the Network functions.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A245T.1	3	3	3	3	-	-	-	-	-	-	-	-	3	-
19A245T.2	3	3	-	-	3	-	-	-	3	-	-	-	2	-
19A245T.3	3	3	3	-	-	3	-	-	-	-	-	-	2	1
19A245T.4	2	2	2	-	-	-	-	-	-	-	-	-	2	-
19A245T.5	1	1	-	1	-	-	-	-	-	-	-	-	2	-

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

Title of the Course	Life Sciences for Engineers
Category	BS
Course Code	19AC44T
Year	II B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
2	-	-	2

Course Objectives:

- Introduce the molecular basis of life.
- Provide the basis for classification of living organisms.
- Describe the transfer of genetic information.
- Introduce the techniques used for modification of living organisms.
- Describe the applications of biomaterials

Unit 1 Living Organisms 9

Comparison of biological organisms with manmade systems, Classification of living organisms, Cellular basis of life, differences between prokaryotes and eukaryotes, classification on the basis of carbon and energy sources, molecular taxonomy.

Unit 2 Proteins and Enzymes 9

Water, Biomolecules, structure and functions of proteins and nucleic acids, hemoglobin, antibodies and enzymes, Industrial applications of enzymes, Fermentation and its industrial applications

Unit 3 Human Physiology 9

Bioenergetics, Respiration: Glycolysis and TCA cycle, Electron transport chain and oxidative phosphorylation, Mechanism of photosynthesis, Human physiology, neurons, synaptic and neuromuscular junctions

Unit 4 Genes and DNA 9

Mendel's laws, gene mapping, Mitosis and Meiosis, single gene disorders in humans, Genetic code, DNA replication, Transcription, Translation

Unit 5 RNA 9

Recombinant DNA Technology: recombinant vaccines, transgenic microbes, plants and animals, animal cloning, biosensors, biochips.

Prescribed Text Books

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A global approach", Pearson Education Ltd, 2018.
2. Arthur T Johnson, Biology for Engineers, CRC press, 2011

Reference Books

1. Alberts Et.Al. The molecular biology of the cell, 6/e, Garland Science, 2014
2. E. E. Conn, P. K. Stumpf, G. Bruening and R. H. Doi, "Outlines of Biochemistry", John Wiley and Sons, 2009.
3. John Enderle and Joseph Bronzino Introduction to Biomedical Engineering, 3/e, 2012

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Explain catalytic properties of enzymes.	L2
2. Summarize application of enzymes and fermentation in industry.	L2
3. Identify DNA as a genetic material in the molecular basis of information transfer.	L2
4. Apply thermodynamic principles to biological systems.	L2
5. Analyze biological processes at the reductionistic level.	L4

6. Identify the potential of recombinant DNA technology. L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC44T .1												
19AC44T .2												
19AC44T .3												
19AC44T .4												
19AC44T .5												
19AC44T .6												

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

Title of the Course	Constitution of India
Category	MC
Course Code	19AC47T
Year	II B.Tech
Semester	II Semester (Common to EEE and ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	0

Course Objectives:

- To enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of india and election commission of india.
- To understand the central and state relation financial and administrative

Unit 1 9

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Unit 2 9

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions

Unit 3 9

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

Unit 4 9

Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

Unit 5 9

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

Prescribed Text Books

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust

Reference Books

1. J.A. Siwach, Dynamics of Indian Government & Politics
2. D.C. Gupta, Indian Government and Politics
3. M.V. Pylee, India's Constitution

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand historical background of the constitution making and its importance for building a democratic India.	L2
2. Understand the functioning of three wings of the government i.e., executive, legislative and Judiciary.	L2
3. Understand the value of the fundamental rights and duties for becoming good citizen of India.	L2
4. Analyze the decentralization of power between central, state and local self-government.	L3
5. Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC47T.1	-	-	-	-	-	-	-	-	-	-	-	3
19AC47T.2	-	-	-	-	-	-	-	-	-	-	-	3
19AC47T.3	-	-	-	-	-	-	-	-	-	-	-	3
19AC47T.4	-	-	-	-	-	-	-	-	-	-	-	3
19AC47T.5	-	-	-	-	-	-	-	-	-	-	-	3

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

Title of the Course	Electrical Machines –II Lab
Category	PC
Course Code	19A241L
Year	II B.Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Course Objectives:

- Determination of performance of transformers and induction motors; V and inverted V curves, Regulation of alternator's, Xd and Xq of a salient pole synchronous machine.

List of Experiments
Perform any ten in the following Experiments

1. Determination of performance of single phase transformer using O.C. and S.C. tests.
2. Determination of performance of single phase transformer using Sumpner's test.
3. Verify the conversion of 3-phase supply to 2-phase supply using Scott connection of transformers.
4. Determination of performance of three phase induction motor using No-load & blocked rotor tests.
5. Determination of Regulation of a three phase alternator by E.M.F and M.M.F. methods.
6. Draw the V and inverted V curves of a three phase synchronous motor.
7. Obtain the Equivalent circuit of a single phase induction motor.
8. Determination of Xd and Xq of a salient pole synchronous machine.
9. Share the common load using Parallel operation of single phase transformers.
10. Separation of core losses of a single phase transformer.
11. Determination of performance of three phase induction motor using Brake test.
12. Separation of no-load losses of three phase induction motor.
13. Determination of performance of single phase induction motor using Brake test.
14. Determination of Regulation of three phase alternator by Z.P.F. and A.S.A methods.
15. Determination of Efficiency of a three phase alternator.
16. Measurement of sequence impedance of a three phase alternator.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Demonstrate knowledge on identification of parts of transformers and AC machines.	L1
2. Analyze the performance of transformers and AC machines.	L4
3. Design the experimental circuit based on loading and rating of Transformers & AC machines.	L4
4. Demonstrate skills in • Obtaining the various characteristics of transformers and AC machines. • Determining the performance characteristics of transformers and AC Machines. • Determining and separation of losses in transformers and AC machines.	L1
5. Function effectively as an individual and as member in a team.	L2
6. Communicate effectively verbal and written forms.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A241L.1	3	-	-	-	-	-	-	-	-	-	-	3	3	-
19A241L.2	2	3	-	-	-	-	-	-	-	-	-	3	3	-
19A241L.3	1	2	3	-		-	-	-	-	-	-	2	3	-
19A241L.4	3	2	2	-	3	-	-	-	-	-	-	1	-	3
19A241L.5	2	2	1	-	-	-	-	-	-	3	-	2	-	3
19A241L.6	1	-	-	-	-	-	3	-	3	-	-	1	-	-

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

Title of the Course	Electrical Circuits and Simulation Lab
Category	PC
Course Code	19A245L
Year	II B.Tech
Semester	II semester

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Course Objectives:

- To impart knowledge and practical exposure on various theorems of electrical circuits and to apply simulation to Electrical circuits.

Perform any ten experiments out of the following

1 Verification of Mesh & Nodal analysis
2 Verification of Thevenin's and Maximum Power Transfer theorems
3 Verification of Superposition theorem
4 Verification of compensation theorem
5 Verification of Reciprocity and Millman's theorems
6 Simulation of DC circuits.
7 DC Transient response
8 Determination of self and mutual inductances and co-efficient of coupling
9 Calibration of Z and Y Parameters.
10 Calibration of Transmission and hybrid parameters
11 Series and Parallel resonance.
12 Measurement of Active power for Star and Delta connected balanced loads
13 Measurement of Reactive power for Star and Delta connected balanced loads
14 Measurement of 3-phase power by two-watt meter method for unbalanced loads.
15 Locus diagram of RL & RC series circuits.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Analyze the basics of Electrical Circuits.	L4
2. Analyze 1-Φ AC Circuits.	L4
3. Analyze the Phenomenon of Resonance.	L4
4. Analyze Star and Delta Connections, Phase and Line quantities.	L4
5. Emphasize power measurement in three phase circuits.	L3
6. Solve electric circuits using network theorems.	L3
7. Analyze magnetic circuits.	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A245L.1	3	-	3	3	-	-	-	-	3	-	-	-	3	-
19A245L.2	3	-	3	3	-	-	-	-	3	-	-	-	3	-
19A245L.3	3	-	3	3	-	-	-	-	3	-	-	-	3	-
19A245L.4	3	-	3	3	-	-	-	-	3	-	-	-	3	-
19A245L.5	3	-	3	3	-	-	-	-	3	-	-	-	3	-
19A245L.6	3	-	3	3	-	-	-	-	3	-	-	-	3	-
19A245L.7	3	-	3	3	-	-	-	-	3	-	-	-	3	-