ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET

(An Autonomous Institution)

ACADEMIC REGULATIONS (R20), COURSE STRUCTURE AND SYLLABI

For the students admitted to

B. Tech., Regular Four Year Civil Engineering Degree Programme from the Academic Year 2020-21, B.Tech Honors and Minors

and

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

VISION AND MISSION OF THE INSTITUTION

Vision

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

Mission

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

ACADEMIC RULES AND REGULATIONS OF FOUR-YEAR B. TECH

CIVIL ENGINEERING REGULAR DEGREE PROGRAMME

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

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

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1. PREAMBLE

Annamacharya Institute of Technology and Sciences (Autonomous), Rajampet, relentlessly aims to achieve academic excellence by implementing new initiatives in teaching-learning and evaluation processes. Based on the directions of the University Grants Commission (UGC), New Delhi, All India Council for Technical Education (AICTE), New Delhi and Jawaharlal Nehru Technological University Anantapur (JNTUA) Anantapuramu, the institute adopted AICTE and APSCHE model curriculum, with minor modifications to match the needs, expectations, and skillsets of students of the region, in both the under- graduate and post-graduate programmes offered from the academic year 2020-21.

2. APPLICATION AND COMMENCEMENT

- The regulations are quite comprehensive and include definitions of key terms, semester system, credit system, grading system and other relevant details.
- The regulations detailed herein shall apply to all the regular under-graduate programmes offered by the Institute.
- The regulations shall be applicable and come into force to the student batches admitted from the academic year 2020-21 and Lateral Entry students admitted from the academic year 2021-22
- The Institute may revise, amend or change the regulations, scheme of examinations and syllabi, from time to time, if found necessary and on approval by the Academic Council of the Institute, keeping the recommendations of the BoS in view.
- Any or all such amendments shall be effective from such date and to such batches of students including those already undergoing the programme, as may be approved through Academic Council of the Institute.
- These regulations shall be called R20 Regulations.

3. ELIGIBILITY FOR ADMISSION

3.1 ADMISSION INTO ENGINEERING UNDER GRADUATION PROGRAMMES (REGULAR)

The eligibility criteria for admission into engineering under graduate programmes offered at AITS shall be as prescribed by the Government of Andhra Pradesh. The criteria are given below:

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

Category – A Seats

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

Category – B Seats

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

3.2 ADMISSION INTO SECOND YEAR (Lateral Entry Scheme)

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

4. Medium of Instruction

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

5. B.TECH. PROGRAMME STRUCTURE

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

Semester Scheme

- The B. Tech Programmes offered at AITS follow **semester scheme** pattern.
- The duration of a B. Tech. Programme shall be of **4 academic** years for 4 year B. Tech programmes **and 3 academic years** for 3 year B. Tech programmes in lateral entry scheme**.**
- Each academic year shall have **2 semesters** i.e., odd and even semesters and shall be counted as first semester, second semester, and third semester and so on up to eighth semester.
- Each semester shall consist of **16 weeks** of academic work including internal examinations.
- Each semester is structured to provide credits totalling to **160 credits** for the entire B.Tech. Programme.
- Each semester shall have **Continuous Internal Evaluation (CIE)** and **Semester End Examination (SEE)** for both Theory and Lab courses.
- Each student is required to secure a total of **160 credits with a CGPA ≥ 5** for the completion of the UG programme and the award of the B.Tech. Degree.
- A student after securing admission into a 4 year B.Tech Programme at AITS shall pursue and acquire the B.Tech. degree in a **minimum period of four academic years i.e., 8 semesters** and a **maximum period of eight academic years i.e., 16 semesters** starting from the date of commencement of I year I

semester, failing which the student shall forfeit the seat in B.Tech. Programme.

- A student after securing admission into a 3 year B. Tech Programme (Lateral Entry) at AITS shall pursue and acquire the B.Tech. Degree in a **minimum period of three academic years i.e., 6 semesters** and a **maximum period of six academic years i.e., 12 semesters** starting from the date of commencement of II year I semester, failing which the student shall forfeit the seat in B.Tech. programme

6. PROGRAMMES OFFERED BY THE INSTITUTE

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

SNo	Name of the Program	Programme Code
1	Civil Engineering	01
2	Electrical and Electronics Engineering	02
3	Mechanical Engineering	03
4	Electronics and Communication Engineering	04
5	Computer Sciences and Engineering	05
6	Artificial Intelligence and Data Science	30
7	Computer Science and Engineering (Artificial Intelligence)	31
8	Computer Science and Engineering (Artificial Intelligence)	32
9	Artificial Intelligence and Machine Learning	33

7. COURSES AND CREDIT STRUCTURE

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

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

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

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

Type of Class	Semester	
	Periods per Week	Credits
Theory (Lecture/Tutorial)	01	01
	02	02
	03	03
	04	04
Practical	02	01
	03	1.5
	04	02
Project Work / Internship	-	16.5

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

Course offering Department	Code
Basic Science Courses	C
Humanities and Social Science Courses including Management Courses	
Civil Engineering	1
Electrical and Electronics Engineering	2
Mechanical Engineering	3
Electronics & Communication Engineering	4
Computer Science & Engineering	5
Artificial Intelligence and Data Science	30
Computer Science and Engineering (Artificial Intelligence)	31
Computer Science and Engineering (Data Science)	32
Artificial Intelligence and Machine Learning	33

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

7.1 Types of Courses:

TYPE OF COURSES	COURSE CATEGORY	CODE	DEPARTMENT OF CIVIL ENGINEERING
Foundation	Engineering Sciences	ESC	24
	Basic Sciences	BSC	21
	Humanities & Social Sciences and Management	HSMC	10.5
Core	Professional Core	PCC	51
Project	Project (12)	PROJ	16.5
	Internship (4.5)		
Elective courses	Professional Elective	PEC	15
	Open Elective (including two MOOCs)	OEC	12
Mandatory Courses	Mandatory	MC	-
Skill Oriented Courses		SC	10
Total Credits			160

7.1.1 Foundation Courses

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

7.1.2 Professional Core Courses

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

7.1.3 Professional Core Electives

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

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

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

7.1.4 Open Electives

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

Every student shall earn prescribed credits by choosing one of the open elective courses from the list of Open Electives given in the Curriculum. Further students from a particular program/branch can opt for one Open Elective (OEC1) offered by their concerned department. However, one Open Electives (OEC2) is inter-disciplinary and shall be offered by other branches.

Two Open electives (OEC3 & OEC4) are to be chosen from the repository of **inter-disciplinary MOOCs** courses offered by NPTEL or any other recognized Institutions/Organization. Students shall consult their

class mentors before opting for an open elective course (MOOCs)

The following guidelines are pertaining to Open Elective Courses.

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

7.1.5 Massive Open Online Courses as Open Elective

- MOOCs (Massive Open Online Courses) are introduced to meet with the global requirements and to inculcate the habit of self-learning and in compliance with the UGC guidelines
- A student shall be permitted to pursue up to a maximum of two electives courses under MOOCs during programme. Each of courses must be of minimum 12 weeks in duration.
- Concerned departments **shall declare the list of inter-disciplinary** courses that a student can pursue through MOOCs at the beginning of the corresponding semester.
- Students interested in pursuing MOOCs shall register for the course and submit this information at their department office at the start of the corresponding semester.
- Course content for the selected MOOCs shall be drawn from the respective MOOCs offering Portal.
- Course progress shall be monitored by the Mentors designated by the HoD.
- Grade obtained through the evaluation of the MOOC shall be considered for the CGPA calculation.
- Three credits shall be awarded to the student upon successful completion of MOOC.
- In case a student fails to complete the MOOCs he/she shall re-register for the same with the same provider, already offered that course. In case that provider discontinues to offer the course, Institution shall conduct an offline examination in the same format, which student already appeared in online examination, as per the MOOC syllabus.

7.1.6 Skill Oriented Courses

- There shall be 5 skill oriented course offered during 3rd to 7th semester. Among the 5 skill oriented courses, 4 courses shall focus on the basic advanced skills related to the domain courses and remaining 1 shall be a soft skills course.
- Skill oriented / skill advanced courses carry 2 credits
- For skill oriented/skill advanced course, 1 theory and 2 practical hours may be allotted as per the

decision of concerned BOS.

- Out of the 5 skill courses 2 shall be skill-oriented courses from the same domain and shall be completed in 2nd year. Of the remaining 3 skills course, 1 shall be necessarily be a soft skill course and the remaining 2 shall be skill advanced courses either from the same domain or job oriented skill course, which can be of inter-disciplinary nature.
- A pool of interdisciplinary job-oriented skill course shall be designed by a common Board of studies by the participating departments and the syllabus along with the pre-requisites shall be prepared for each of the laboratory infrastructure requirements,
- The student shall be given an option to choose either the skill courses being offered by the institute or to choose a certificate course being offered by Industries/Professional Bodies/ APSSDC or any other accredited bodies as approved by the concerned BOS.
- If a student chooses to take a certificate course offered by Industries/Professional Bodies/ APSSDC or any other accredited bodies, in lieu of the skill advanced course offered by the department, the credits shall be awarded to the student upon producing the course completion certificate from Industries/Professional Bodies/ APSSDC as approved by the concerned BOS.
- If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill oriented course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the concerned BOS, the student is deemed to have fulfilled the attendance requirements of the course and acquire the credits assigned to the course.
- A committee shall be formed at the level of the institute to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades. The recommended conversions and appropriate grades/marks are to be approved by the Academic Council

7.1.7 Mandatory Courses

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

7.1.8 Universal Human Values (UHV) Courses

- Universal Human Values-I shall be offered during the Student Induction Programme with no credits.
- Universal Human Values-II course carries 3 credits. The assessment is to provide a fair state of development of the student, so participation in classroom discussions, self-assessment, peer assessment etc. will be used in evaluation.
- A student has to secure 40% marks out of 100 in the CIE and SEE together to qualify for the award of the degree. The distribution shall be 50 marks for continuous internal assessment and 50 marks for semester end examination.
- Internal evaluation shall be conducted for the course during semester and shall be evaluated for 50 marks and distributions of marks as follows:
    - Assessment by faculty mentor: 10 marks
    - Self-assessment: 10 marks
    - Assessment by peers: 10 marks
    - Socially relevant project/Group Activities/Assignments: 20 marks

8. Evaluation Process

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

- For a Theory course, the distribution shall be 30 marks for Internal Evaluation and 70 marks for End-Examinations. The distribution is detailed in 8.1.1.
- For a Lab course, the distribution shall be 30 marks for Internal Evaluation and 70 marks End-Examinations. The distribution is detailed in 8.1.3
- Project Work shall be evaluated for 200 marks. Mandatory courses with no credits shall be evaluated for 100 marks.

8.1 Internal Evaluation

For a Theory Course, 30 marks are allotted for Internal Evaluation. Two Internal examinations (Theory Internal Examinations) shall be conducted for a Theory Course during a semester and they shall be evaluated for 30 marks of which 25 marks are given for Internal Examination and 5 marks for assignment. For Lab Course, there shall be a continuous internal evaluation during the semester for 30 marks.

8.1.1 Theory Internal Examinations

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

Part B shall contain three either type questions (Total six questions from 1 to 6). Each question shall carry 10 marks. 30 marks allotted for Part B shall finally be scaled down to 20 marks. The questions shall be set/ moderated such that the student can comfortably answer each question within the stipulated time.

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

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

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

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

(ii) The student shall answer three questions

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

For Example:

Marks obtained in I Internal examination: 19

Marks obtained in II Internal examination: 10

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

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

For Example:

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

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

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

Of the 30 internal evaluation marks, day-to-day performance of the student shall be evaluated for 20 marks and internal examination carries 10 marks. Day-to-day work shall be evaluated by the teacher concerned based on the exercises/submissions/assignments prepared in the class. Two internal examinations shall be conducted in a semester for duration of 2 hours each for 10 marks with a weightage of 80% for better of the two and 20% for the other. The sum of day-to-day work and the internal examination marks will be the final internal evaluation for 30 marks for the subject. End examination shall be for 70 marks and is of 3 hours

duration. The question paper shall be with 5 questions, one question from each unit with internal choice. All questions carry 14 marks each.

8.1.2 Assignment (Theory)

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

8.1.3 Lab Internal Evaluation

Out of the 30 marks allotted for Lab Internal Evaluation, day-to-day performance of the student in the laboratory shall be evaluated for 20 marks by the concerned laboratory teacher based on experimental evaluation/record/viva. Two Lab Internal examinations shall be conducted for 10 marks by the concerned teacher. Performance of one best out of two tests to be considered.

8.1.4 Internal Evaluation of Mandatory Courses

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

8.1.5 Make-up Internal Evaluation

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

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

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

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

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

Course type: Laboratory

Distribution of marks: 30:70

Evaluation Type: Internal Evaluation

A student is evaluated for a maximum of 100 marks with respect to skill oriented course / Skill advanced courses / Soft skill course. The distribution of marks shall be 30 for internal evaluation and 70 for external evaluation. For Internal Evaluation, day-to-day performance of the student in the laboratory shall be evaluated for 30 marks by the concerned skill oriented course / Skill advanced courses / Soft skill course class teacher based on experimental evaluation / discussions / results / reports. External evaluation is done for 70 marks in a laboratory end semester examination conducted for 3 hours.

Note: Each skill oriented course / Skill advanced courses / Soft skill course will have its own evaluation procedure and weightage.

8.2 End Evaluation

8.2.1 Theory End Evaluation

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

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

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

Question paper pattern for Semester End Examination (70 Marks) shall be as follows:

PART A: 5 x 2 = 10 Marks

(i) There shall be one question from each unit

(ii) Part A is compulsory.

PART B: 5 x 12 = 60 Marks

(i) Five questions with internal choice will be given

(ii) There shall be one question from each unit with Internal Choice i.e., ‘either’ or ‘choice’

(iii) Sub questions may also be given.

8.2.2 Lab End Examination

As specified in 8.0, Lab End Evaluation is done for 70 marks, in the form a Lab End Examination that shall be conducted for 3 hours in respective Laboratory. Each lab course will have its own evaluation procedure and weightage.

8.2.3 Supplementary Theory/Lab End Examinations

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

8.2.4 Challenge Evaluation, Revaluation and Recounting

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

9.0 Internship and Project Evaluation

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

- A student shall carry a mandatory Internship for 2 months for 1.5 credits in 2nd year 2nd semester during summer vacation and it is evaluated during 3rd year 1st semester. A student shall carry a mandatory Industrial / Research Internship for 2 months for 3 credits in 3rd year 2nd semester during summer vacation and it is evaluated during 4th year 1st semester.
- Two summer internships each with a minimum of 6 weeks duration. Done at the end of 2nd and 3rd year, respectively are mandatory. The internship can be done by the students at local industries, Govt. Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs
- Evaluation of the summer internships shall be through the departmental committee. A student will be required to submit a summer internship report to the concerned departments and appear for an oral presentation before the departmental committee. The report and the oral presentation shall carry 40% and 60% weightages respectively.

- In the final semester, the student should mandatorily undergo internships and parallelly he/she should work on a project with well-defined objectives. At the end of the semester the candidates shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship. The project report shall be evaluated with an external examiner.
- The institute shall facilitate and monitor the student internship programs. Completion of internships is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.
- There shall also be mandatory full internship in the final semester of the programme along with the project work.
- For other details, please refer to Appendix I.

9.2 Project Work

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

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

10. Curricular Framework for Honors Programme

- Students of a Department/ Discipline are eligible to opt for Honors Programme offered by the same Department/Discipline
- A student shall be permitted to register for Honors program at the beginning of 4th semester provided that the student must have acquired a minimum of 8.0 SGPA up to the end of 2nd

semester without any backlogs. In case of the declaration of the 3rd semester results after the commencement of the 4th semester and if a student fails to score the required minimum of 8 SGPA, his/her registration for Honors Programme stands cancelled and he/she shall continue with the regular Programme.

- Students can select the additional and advanced courses from their respective branch in which they are pursuing the degree and get an honors degree in the same. e.g. If a Mechanical Engineering student completes the selected advanced courses from same branch under this scheme, he/ she will be awarded B.Tech (honors) in Mechanical Engineering.
- In addition to fulfilling all the requisites of a Regular B.Tech Programme, a student shall earn 20 additional credits to be eligible for the award of B.Tech (Honors) degree. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160 credits).
- Of the 20 additional Credits to be acquired, 16 credits shall be earned by undergoing specified courses listed as pools, with four courses, each carrying 4 credits. The remaining 4 credits must be acquired through two MOOCs, which shall be domain specific each with 2 credits and with a minimum duration of 8/12 weeks as recommended by the Board of studies.
- It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. The courses offered in each pool shall be domain specific courses and advanced courses.
- The concerned BoS shall decide on the minimum enrolments for offering Honors program by the department. If minimum enrolments criteria are not met then the students shall be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BoS.
- Each pool can have theory as well as laboratory courses. If a course comes with a lab component, that component has to be cleared separately. The concerned BoS shall explore the possibility of introducing virtual labs for such courses with lab component. (Model pool list is enclosed in the end of the syllabus)
- MOOC courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC Courses. Students have to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned will be as decided by the Academies Council.

- The concerned BoS shall also consider courses listed under professional electives of the respective B. Tech Programmes for the requirement of B.Tech (Honors). However, a student shall be permitted to choose only those courses that he/she has not studied in any form during the Programme.
- If a student drops or is terminated from the Honors programme, the additional credits so far earned cannot be converted into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.
- In case student fails to meet the CGPA requirement for Degree with Honors at any point after registration, he/she will be dropped from the list of students eligible for Degree with honors and they will receive regular B.Tech degree only, however, such students will receive a separate grade sheet mentioning the additional courses completed by them.
- Honors must be completed simultaneously with a major degree Programme. A student cannot earn Honors after he/she has already earned bachelor's degree.

11. Curricular Framework for Minor Programme

- a) Students who are desirous of pursuing their special interest areas other than the choses discipline of Engineering may opt for additional courses in minor specialization groups offered by a department other than their parent department. For example, if Mechanical Engineering student select subjects from Civil Engineering under this scheme, he/she will get Major degree of Mechanical Engineering with minor degree of Civil Engineering.

  b) Student can also opt for Industry relevant tracks of any branch to obtain the Minor Degree, for example, a B.Tech Mechanical student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine Learning track etc.
- The BOS concerned shall identify as many tracks as possible in the areas of emerging technologies and industrial relevance/demand. For example, the minor tracks can be the fundamental courses in CSE, ECE, EEE, CE, ME etc., or industry tracks such as Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), Robotics, Electric Vehicles, and VLSI etc.,
- The list of disciplines / branches eligible to opt for a particular industry relevant minor specialization shall be clearly mentioned by the respective BoS.

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

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

12. Attendance Requirements and Detention Policy

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

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

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

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

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

13. Minimum Academic Requirements and Award of the Degree

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

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

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

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

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

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

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

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

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

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

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

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

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

14.1 Computation of SGPA

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

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

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

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.

14.2 Computation of CGPA

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

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

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

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.

14.3 Grade Card

The grade card issued shall contain the following

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

Example: - Computation /calculation of SGPA

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

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

Example Illustration of CGPA

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5
Credit: 20 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.

14.4 Conversion of SGPA into percentage

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

Percentage = (CGPA - 0.50) * 10

14. Transcripts

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

16. Transitory Regulations

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

17. Readmission of Students

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

18. Minimum Instruction Days for a Semester

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

19. Student transfers

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

20. Announcement of results

- Results review committee comprising of University nominee, Principal, Dean Academics, Chairmen of various boards of studies, Controller of Examinations and Deputy Controller of Examinations will monitor the results and gives the permission for announcement of results.
- After review meeting results are loaded in to Institution website from which students can access their results by entering Hall Ticket number. And also results in form of hard copy are available with respective Heads of the departments.

21. General Instructions:

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

Appendix-I: Internship Guidelines

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

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

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

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

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

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

Step 6: Training Certificate to be obtained from industry.

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

For more details refer:

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

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

Revaluation / Recounting:

- The students who wishes to apply for Revaluation/Recounting of his/her answer-books(s) must submit his/her application on the prescribed 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	Expulsion from the examination hall and cancellation of the

	examination hall.	performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If students of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in 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. Life Sciences for Engineers (mandatory non-credit course prescribed at 3/4 semester)
3. Constitution of India (mandatory non-credit course prescribed at 5/6 semester)
4. Essence of Indian Traditional Knowledge (mandatory non-credit course prescribed at 5/6 semester)

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

Semester 5 to 8

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

STUDENT INDUCTION PROGRAMME (Zero Semester)

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

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

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

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

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

BASIC COURSE STRUCTURE FOR B. TECH CIVIL ENGINEERING R20 REGULATIONS

Semester I (First year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	20AC11T	Algebra and Calculus	3	0	0	3
2	BSC	20AC14T	Engineering Chemistry	3	0	0	3
3	HSMC	20AC15T	Communicative English	3	0	0	3
4	ESC	20A312T	Engineering Drawing	1	0	4	3
5	ESC	20A511T	Problem Solving through C Programming	3	0	0	3
6	BSC	20AC14L	Engineering Chemistry Lab	0	0	3	1.5
7	HSMC	20AC15L	Communicative English Lab	0	0	3	1.5
8	ESC	20A511L	C Programming Lab	0	0	3	1.5
9	MC	20AC16T	Environmental Science	3	0	0	0
						Total credits	19.5

Category	Credits
Basic Science Courses	7.5
Engineering Science Courses	7.5
Humanities and Social Science	4.5
Total Credits	19.5

Semester II (First year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	20AC21T	Differential Equations and Vector Calculus	3	0	0	3
2	BSC	20AC24T	Engineering Physics	3	0	0	3
3	ESC	20A323T	Engineering Mechanics	3	0	0	3
4	ESC	20A223T	Basic Electrical and Electronics Engineering	3	0	0	3
5	ESC	20A325T	Basic Mechanical Engineering	3	0	0	3
6	ESC	20A223L	Basic Electrical and Electronics Lab	0	0	3	1.5
7	ESC	20A326L	Engineering & IT Workshop	0	0	3	1.5
8	BSC	20AC24L	Engineering Physics Lab	0	0	3	1.5
						Total credits	19.5

Category	Credits
Basic Science Courses	7.5
Engineering Science Courses	12
Total Credits	19.5

BASIC COURSE STRUCTURE FOR B. TECH CIVIL ENGINEERING R20 REGULATIONS

Semester III (Second year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	20AC31T	Partial Differential Equations and Numerical Methods	3	0	0	3
2	HSMC	20AC35T	Managerial Economics and Financial Analysis	3	0	0	3
3	PCC	20A131T	Advanced Surveying	3	0	0	3
4	PCC	20A132T	Strength of Materials	3	0	0	3
5	PCC	20A133T	Fluid Mechanics & Hydraulic Engineering	3	0	0	3
6	PCC	20A131L	Advanced Surveying Lab	0	0	3	1.5
7	PCC	20A132L	Strength of Materials Lab	0	0	3	1.5
8	PCC	20A134L	Fluid Mechanics Lab	0	0	3	1.5
9	MC	20AC34T	Life Sciences for Engineers	3	0	0	0
10	SC	20A535L	Python Programming	1	0	2	2
						Total credits	21.5

Category	Credits
Basic Science Courses	3
Humanities and Social Science Including Management Courses	3
Professional Core Courses	13.5
Skill Oriented Course	2
Total Credits	21.5

Semester IV (Second year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	20AC41T	Probability and Statistics	3	0	0	3
2	ESC	20A141T	Civil Engineering Drawing	3	0	0	3
3	PCC	20A142T	Material Testing and Evaluation	3	0	0	3
4	PCC	20A143T	Engineering Geology	3	0	0	3
5	PCC	20A144T	Structural Analysis	3	0	0	3
6	PCC	20A143L	Engineering Geology Lab	0	0	3	1.5
7	PCC	20A145L	Material Testing Lab	0	0	3	1.5
8	PCC	20A146L	Hydraulics Engineering Lab	0	0	3	1.5
9	SC	20A147L	Computer Aided Civil Engineering Drawing Lab	1	0	2	2
						Total credits	21.5
Internship 2 Months (Mandatory) during summer vacation							

Category	Credits
Basic Science Courses	3
Professional Core Courses	13.5
Engineering Science Courses	3
Skill Oriented Course	2
Total Credits	21.5

BASIC COURSE STRUCTURE FOR B. TECH CIVIL ENGINEERING R20 REGULATIONS

Semester V (Third year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PCC	20A151T	Basic Reinforced Concrete Design	3	0	0	3
2	PCC	20A152T	Environmental Engineering	3	0	0	3
3	PCC	20A153T	Water Resource Engineering	3	0	0	3
4	OEC	20AC5AT	Literature and Life	3	0	0	3
		20AC5BT	Linear Algebra and Numerical Analysis				
		20A305GT	Foundation of Artificial Intelligence and Data Structures				
		20A305HT	Machine Learning				
		20A55FT	Data Structures Using Python				
		20A55GT	Data Base Management System				
		20A45ET	Electronic Circuit and its Applications				
		20A45FT	Introduction to Communication Systems				
		20A25ET	Energy Auditing Conservation and Management				
		20A25FT	Electrical Vehicles				
		20A35ET	Non-Conventional Sources of Energy				
		20A35FT	Industrial Management & Entrepreneurship				
		20AE5AT	Human Resource Management				
		20AE5BT	Intellectual Property Rights				
5	PEC	20A15AT	Sustainable Construction Methods	3	0	0	3
		20A15BT	Advanced Structural Analysis				
		20A15CT	Remote Sensing and GIS				
		20A15DT	Urban Transportation and Planning				
6	PCC	20A152L	Environmental Engineering Lab	0	0	3	1.5
7	PCC	20A154L	Structural Analysis & Design Lab (STAAD Pro)	0	0	3	1.5
8	MC	20AC53T	Essence of Indian Traditional Knowledge	2	0	0	0
9	SC	20A555L	JAVA Programming	1	0	2	2
10	PROJ	20A155I	Summer Internship 2 Months (Mandatory) after second year (to be evaluated during Semester V)	0	0	0	1.5
						Total credits	21.5
Internship 2 Months (Mandatory) during Summer Vacation							

Category	Credits
Professional Core Courses	12
Professional Elective Courses	3
Open Elective Course/Job Oriented Elective	3
Skill Advanced Course/ Soft Skill Course	2
Summer Internship	1.5
Total Credits	21.5

BASIC COURSE STRUCTURE FOR B. TECH CIVIL ENGINEERING R20 REGULATIONS

Semester VI (Third year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PCC	20A161T	Transportation Engineering	3	0	0	3
2	PCC	20A162T	Engineering Estimation, Costing and Valuation	3	0	0	3
3	PCC	20A163T	Soil Mechanics	3	0	0	3
4	PEC	20A16AT	Design of Steel Structures	3	0	0	3
		20A16BT	Construction Project Management				
		20A16CT	Advanced Environmental Engineering				
		20A16DT	Earthquake Resistant Design and Detailing				
5	OEC	20A16ET	MOOCS (Self Disciplinary)	3	0	0	3
6	PCC	20A161L	Transportation Engineering Lab	0	0	3	1.5
7	PCC	20A163L	Soil Mechanics Lab	0	0	3	1.5
8	PCC	20A164L	Structural Analysis& Design Lab (E-Tabs)	0	0	3	1.5
9	MC	20AC62T	Constitution of India	2	0	0	0
10	SC	20AC61L	Professional Communication	1	0	2	2
						Total credits	21.5
Industrial/Research Internship (Mandatory) 2 Months during Summer Vacation							

Category	Credits
Professional Core Courses	13.5
Professional Elective Courses	3
Open Elective Course/Job Oriented Elective	3
Skill Advanced Course/ Soft Skill Course	2
Mandatory Course	0
Industrial / Research Internship (Mandatory) 2 Months	-
Total Credits	21.5

BASIC COURSE STRUCTURE FOR B. TECH CIVIL ENGINEERING R20 REGULATIONS

Semester VII (Fourth year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PEC	20A17AT	Advanced RCC Design	3	0	0	3
		20A17BT	Advanced Transportation Engineering				
		20A17CT	Bridge Engineering				
		20A17DT	Structural Health Monitoring, Repair and Rehabilitation of Structures				
2	PEC	20A17ET	Foundation Engineering	3	0	0	3
		20A17FT	Finite Element Method				
		20A17GT	Design and Drawing of Irrigation Structures				
		20A17HT	Experimental Stress Analysis				
3	PEC	20A17IT	Prestressed Concrete	3	0	0	3
		20A17JT	Environmental Impact Assessment & Life Cycle Assessment				
		20A17KT	Ground Improvement Techniques				
		20A17LT	Air Pollution and Control Engineering				
4	OEC	20A17MT	Disaster Management	3	0	0	3
		20A17NT	Instrumentation and Sensor Technologies				
		20A17OT	Watershed Management				
		20A17PT	Occupational Health, Safety and Environmental Management				
5	OEC	20A17QT	MOOCS (Inter Disciplinary)	3	0	0	3
6	SC	20A171L	Project Management Lab	1	0	2	2
7	HSMC	20AC71T	Universal Human Values-II	3	0	0	3
8	PROJ	20A172I	Industrial / Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester	0	0	0	3
						Total credits	23
Industrial/Research Internship (Mandatory) 2 Months during Summer Vacation							

Category	Credits
Professional Elective Courses	9
Open Elective Course / Job Oriented Elective	6
Humanities and Social Sciences	3
Skill Advanced Course / Soft Skill Course	2
Industrial / Research Internship	3
Total Credits	23

Semester VIII (Fourth year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PROJ	20A181P	Project Work, Seminar and Internship in Industry	0	0	0	12
Internship (6 months)							
			Total credits				12

Open Elective Courses Offered ME, EEE & ECE BRANCHS IN SEMESTER-V (III-YEAR)

Sl.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	OEC	20A15ET	Water Resources and Harvesting	3	0	0	3
2	OEC	20A15FT	Disaster Management	3	0	0	3

Open Elective Courses Offered to CSE & AIDS in SEMESTER VII (IV-YEAR)

Sl.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	OEC	20A17RT	Water Resources and Harvesting	3	0	0	3
2	OEC	20A17ST	Disaster Management	3	0	0	3

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

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

Year I B. Tech.
Semester I Semester
Branch Common to all branches of Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

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

Unit 1 Matrices **10**

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

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

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

Unit 2 Quadratic forms of matrices **8**

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

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

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

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

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

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

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

Unit 4 Multiple Integrals **8**

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

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

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

Unit 5 Special Functions 8

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

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

- Understand the properties of beta and gamma functions and its relations(L2)
- Utilize the special functions in evaluating definite integrals(L3)

Prescribed Textbooks:

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

Reference Books:

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

Course Outcomes:

At the end of the course, the 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. Solve important tools of calculus in higher dimensions and be familiar with 2-dimensional, 3- dimensional coordinate systems	L3
5. Understand the properties of beta and gamma functions and its relations	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC11T.1	3	3	-	-	-	-	-	-	-	-	-	3
20AC11T.2	3	2	-	-	-	-	-	-	-	-	-	3
20AC11T.3	3	3	-	-	-	-	-	-	-	-	-	2
20AC11T.4	3	3	-	-	-	-	-	-	-	-	-	2
20AC11T.5	3	3	-	-	-	-	-	-	-	-	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Department of Humanities and Sciences

Title of the Course Engineering Chemistry
Category BSC
Course Code 20AC14T

Year I B. Tech.
Semester I Semester
Branch CE & ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To acquaint the students with soft and hard water types and softening methods.
- To introduce the basic concepts of electrochemical cells
- To impart knowledge on corrosion and its significance.
- To familiarize the students with engineering materials, their properties and applications

Unit 1 Water Technology 9

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

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

- list the differences between temporary and permanent hardness of water (L1)
- Compare quality of drinking water with BIS and WHO standards. (L4)
- explain the working principles of different Industrial water treatment processes (L4)

Unit 2 Electrochemistry & Corrosion 11

Electrode potential, determination of single electrode potential –Nernst's equation, Reference electrodes – hydrogen and calomel electrodes – electrochemical series and its applications – primary cell, dry or Leclanche cell – secondary cell, lead acid storage cell, nickel-cadmium cell – lithium batteries (Lithium-MnO_2). Fuel cells, Hydrogen- Oxygen fuel cell. Corrosion: Definition – theories of corrosion, dry corrosion and electro chemical corrosion – factors affecting corrosion. Corrosion controlling methods: Sacrificial and Impressed current cathodic protection, anodic and cathodic inhibitors

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

- apply Nernst equation for calculating electrode and cell potentials (L3)
- demonstrate the corrosion prevention methods and factors affecting corrosion (L3)
- compare different batteries and their applications (L4)

Unit 3 Polymers and Fuel Technology 10

Polymers: Introduction to polymers, functionality of monomers, Mechanism of chain growth and step growth polymerization. differences between thermoplastic and thermo setting resins, Preparation, properties and uses of PVC and Bakelite Fuels – Types of fuels, calorific value, determination of calorific value of a fuel using bomb calorimeter, numerical problems based on calorific value. Liquid Fuels - refining of petroleum, fuels for IC engines, knocking and anti-knock agents, Octane and Cetane values. Alternative fuels- propane, power alcohol

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

- list major chemical reactions that are used in the synthesis of polymers (L1)
- explain different types of polymers and their applications (L2)
- solve the numerical problems based on Calorific value(L3)
- explain different types of fuels and their applications (L4)

Unit 4 Advanced Engineering Materials 10

Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications

Refractories- Classification, Properties, Factors affecting the refractory materials and Applications.

Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils and Applications

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

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

- explain the constituents of Composites (L4)
- illustrate the functions and properties of lubricants (L4)
- enumerate the reactions at setting and hardening of the cement (L1)

Unit 5 Nanomaterials and Smart Materials 10

Nano Materials: Introduction to Nano materials, chemical synthesis of nanomaterials by Sol-gel method,Characterization of nanomaterials by XRD & SEM, Applications of nanomaterials in wastewater treatment,lubricants, and engines.

Smart Materials: Introduction – Types of smart materials-self healing materials. Shape memory alloys and Usesof smart materials

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

- summarize the applications of SEM, in surface characterization (L2)
- outline the preparation of nanomaterials (L1)
- distinguish the principles of XRD and SEM (L4)

Prescribed Textbooks:

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

Reference Books:

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

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. compare different water analysis and water treatment methods	L4
2. apply the principles of corrosion control and differentiate various cells	L3
3. explain different types of polymers and fuels	L4
4. explain the classification, properties and applications of engineering materials	L2
5. analyze the properties and applications of nanomaterial and smart materials and distinguish the principles of XRD and SEM.	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC14T.1	3	2	-	-	-	-	-	-	-	-	-	2
20AC14T.2	3	2	-	-	-	-	-	-	-	-	-	2
20AC14T.3	3	2	-	-	-	-	-	-	-	-	-	2
20AC14T.4	3	2	-	-	-	-	-	-	-	-	-	2
20AC14T.5	3	2	-	-	-	-	-	-	-	-	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Department of Humanities and Sciences

Title of the Course Communicative English
Category HSMC
Course Code 20AC15T

Year I B. Tech.
Semester I Semester
Branch CE, ME, CSE, AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

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

Unit 1 **9**

Listening: Identifying the topic, the context, and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies, and interests; introducing oneself and others.
Reading: ***On the Conduct of Life*** **by William Hazlitt**; Skimming to get the main idea of a text; scanning to look for specific pieces of information.
Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.
Grammar and Vocabulary: Parts of Speech, Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.
Learning Outcomes: At the end of this unit, the student will be able to

- understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information (L1)
- ask and answer general questions on familiar topics and introduce oneself/others (L2)
- employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information (L3)
- recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs (L2)
- form sentences using proper grammatical structures and correct word forms (L4)

Unit 2 **9**

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.
Speaking: Discussion in pairs/small groups on specific topics followed by short, structured talks.
Reading: ***The Brook*** **by Alfred Tennyson**; Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.
Grammar and Vocabulary: Cohesive devices - linkers, signposts and transition signals; use of articles and zero article; prepositions.

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

- comprehend short talks on general topics (L1)
- participate in informal discussions and speak clearly on a specific topic using suitable discourse markers (L3)
- understand the use of cohesive devices for better reading comprehension (L1)
- write well-structured paragraphs on specific topics (L4)
- identify basic errors of grammar/ usage and make necessary corrections in short texts (L2)

Unit 3 **9**

Listening: Listening for global comprehension and summarizing what is listened to.
Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed
Reading: ***The Death Trap*** **by Saki**; Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing: Summarizing, Paragraph Writing, identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions
Grammar and Vocabulary: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.
Learning Outcomes: At the end of the unit, the student will be able to

- comprehend short talks and summarize the content with clarity and precision (L1)
- participate in informal discussions and report what is discussed (L3)
- infer meanings of unfamiliar words using contextual clues (L3)
- write summaries based on global comprehension of reading/listening texts (L4)
- use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing(L4)

Unit 4 **9**

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.
Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading: ***Muhammad Yunus****;* Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.
Writing: Writing structured essays on specific topics using suitable claims and evidence.
Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; Voice - Active & Passive Voice
Learning Outcomes: At the end of the unit, the student will be able to

- infer and predict about content of spoken discourse (L2)
- understand verbal and non-verbal features of communication and hold formal/informal conversations (L1)
- interpret graphic elements used in academic texts (L3)
- produce a coherent paragraph interpreting a figure/graph/chart/table (L4)
- use language appropriate for description and interpretation of graphical elements (L3)

Unit 5 **9**

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides.
Reading: ***The Dancer with a White Parasol*** **by Ranjana Deve**; Reading for comprehension.
Writing: Letter Writing: Official Letters/Report Writing
Grammar and Vocabulary: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)
Learning Outcomes: At the end of the unit, the student will be able to

- take notes while listening to a talk/lecture and make use of them to answer questions (L4)
- make formal oral presentations using effective strategies (L4)
- comprehend, discuss, and respond to academic texts orally and in writing. (L3)
- produce a well-organized essay with adequate support and detail (L4)
- edit short texts by correcting common errors (L3)

Prescribed Textbook:

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

Reference Books

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

Course Outcomes:

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

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC15T.1	-	-	-	-	-	-	-	-	-	3	-	2
20AC15T.2	-	-	-	-	-	-	-	-	-	3	-	2
20AC15T.3	-	-	-	-	-	-	-	-	-	3	-	2
20AC15T.4	-	-	-	-	-	-	-	-	-	3	-	2
20AC15T.5	-	-	-	-	-	-	-	-	-	3	-	2

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

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

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

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	4	3

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

Unit 1 Introduction to Drawing and Engineering Curves. Theory Hours: 05
Practice sessions: 04

Introduction: Lettering–Geometrical Constructions-Construction of polygons by General method.
Conics: Ellipse, Parabola and Hyperbola (General method only). Special Methods: Ellipse - Concentric Circles method, Oblong method & Arcs of Circles method - Drawing tangent & normal to the conics.
Cycloidal Curves: Cycloid, Epi-cycloid, Hypo-cycloid (simple problems) - Drawing tangent & normal to the Cycloidal curves.
Learning Outcomes: At the end of the unit, the student will be able to
- Understand the significance of engineering drawing and understand the geometrical constructions, conventions used in the engineering drawing.(L2)
- Identify the curves obtained in different conic sections and able to draw different conic curves. (L1)
- Know and draw the different Cycloidal curves, also its practical application in engineering. (L1)

Unit 2 Projections of Points and Lines. Theory Hours: 03
Practice sessions: 06

Projections of points - Projections of lines inclined to one reference plane, Projections of lines inclined to both reference planes. True lengths and Traces of lines.
Learning Outcomes: At the end of the unit, the student will be able to:
- Understand the principles and elements of projection. (L2)
- Know how to draw the projections of points, lines. (L1)
- Differentiate between projected length and true length and also find the true length of the lines. (L1)

Unit 3 Projections of Planes. Theory Hours: 05
Practice sessions: 04

Projection of planes inclined to one reference plane - and inclined to both the reference planes.
Learning Outcomes: At the end of the unit, the student will be able to:
- Understand the projections of different geometrical regular plane surfaces. (L2)
- Identify and Construct the true shapes of the plane surfaces. (L1)
- Analyze the projections of plane surface inclined to both the planes. (L4)

Unit 4 Projections of Solids. Theory Hours: 04
Practice sessions: 05

Projections Of simple Solids such as Cylinder, Cone, Prism and Pyramid - Axis Inclined to one reference

plane, Axis inclined to both the reference planes.

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

- Understand different types of solids. (L2)
- Draw projection of simple solids. (L3)
- Draw the Projections of solids inclined to both the reference planes. (L3)

Unit 5 Isometric Projections & Conversion of Views. Theory Hours: 04
Practice sessions: 05

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

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

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

- Understand the pictorial views such as isometric views, orthographic views and also differentiate between Isometric Projection and View. (L2)
- Draw the Isometric views of simple plane surfaces and simple solids. (L3)
- Draw the conversions of Isometric Views in to Orthographic Views and Vice-versa. (L3)

Prescribed Text Books:

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

Reference Books:

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

Course Outcomes:

At the end of the course, the student will be able to	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	PSO1	PSO2	PSO3
20A312T.1	3	-	-	-	-	3	2	-	1	2	-	-	-	-	-
20A312T.2	3	-	-	-	-	3	2	-	1	2	-	-	-	-	-
20A312T.3	3	2	-	-	-	3	2	-	1	2	-	-	-	-	-
20A312T.4	3	2	-	-	-	3	2	-	1	2	-	-	-	-	-
20A312T.5	3	-	2	-	2	2	-	3	3	-	-	3	-	-	-

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

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

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

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

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

Unit 1 Problem Solving and Introduction to C 9

Steps to solve problems, algorithm, Pseudo code, Flowchart with examples, Program Development Environments. Introduction to programming: Programming languages and generations.
Introduction to C: Introduction, structure of C program, keywords, identifiers, Variables, data types, constants, I/O statements, operators, precedence and associatively.
Learning Outcomes: At the end of the unit, the student will be able to:
- Identify situations where computational methods and computers would be useful. (L2)
- Approach the programming tasks using techniques learned and write pseudo-code.(L2)
- Choose the right data representation formats based on the requirements of the problem. (L3)
- Write the program on a computer, edit, compile, debug, correct, recompile and run it.(L4)

Unit 2 Introduction to decision control statements and Arrays 9

Selective, looping and nested statements, jumping statements.
Arrays: Introduction, declaration of arrays, accessing and storage of array elements, searching (linear and binary search algorithms) and sorting (selection and bubble) algorithms, multidimensional arrays, matrix operations.
Learning Outcomes: At the end of the unit, the student will be able to
- Use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.(L3)
- Identify tasks in arrays with different techniques that are applicable and apply them to write programs. (L2)
- Design and implement operations on both single and Multidimensional arrays. (L4)

Unit 3 Strings and Functions 9

Strings: Declaration and Initialization, String Input / Output functions, String manipulation functions. Functions: Types of functions, recursion, scope of variables and storage classes.
Preprocessor Directives: Types of preprocessor directives, examples.
Learning Outcomes: At the end of the unit, the student will be able to
- Implement and test the programs on strings using string manipulation functions. (L5)
- Analyze programming problems to choose when regular loops should be used and when recursion will produce a better program (L4)

Unit 4 Pointers 9

Pointers: Understanding computer's memory, introduction to pointers, declaration pointer variables, pointer

arithmetic, pointers and strings, array of pointers, function pointers, dynamic memory allocation, advantages and drawbacks of pointers.

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

- Identify tasks in which the dynamic memory allocation techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task. (L2)
- Design and develop Computer programs, analyzes, and interprets the concept of pointers and their usage. (L6)

Unit 5 Structures and Files 9

Structures: Structure definition, initialization and accessing the members of a structure, nested structures, array of structures, structures and functions, structures and pointers, self-referential structures, unions and enumerated data types.

Files: Introduction to files, file operations, reading and writing data on files, error handling during file operations.

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

- Define derived data types and use them in simple data processing applications. (L2)
- Develop and test C programs for simple applications using files. (L5)

Prescribed Text Books:

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

Reference Books:

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

Course Outcomes:

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

CO-PO Mapping:

SCO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A511T.1	1	2	2	3	-	1	-	-	-	-	-	-	3	-	-
20A511T.2	3	3	3	3	3	-	-	-	1	-	-	-	3	-	-
20A511T.3	3	2	1	2	1	-	-	-	1	-	-	2	3	-	-
20A511T.4	2	3	2	2	3	-	-	-	1	-	1	2	3	-	-
20A511T.5	3	2	2	2	2	-	-	-	1	-	-	2	3	-	-

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

Title of the Course Engineering Chemistry Lab
Category BSC
Course Code 20AC14L

Year I B. Tech.
Semester I Semester
Branch CE & ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:
- To familiarize the students with the basic concepts of chemistry
- To impart training for handling of different instruments.
- To familiarize the students with digital and instrumental methods of analysis.
- To expose the students in practical aspects of the theoretical concepts.

List of experiments
From the following list, any 10 experiments must be performed in a semester
1. Determination of Hardness of a ground water sample by Complexometry.
2. Estimation of active chlorine content in Bleaching powder.
3. Determination of strength of an acid by pH metric method.
4. Determination of Fe (II) in Mohr's salt by potentiometric method.
5. Estimation of mixture of acids by conductometric titration
6. Estimation of Iron in Cement by Colorimetry
7. Preparation of Phenol-formaldehyde resin
8. Determination of strength of solutions by Conductometry
9. Determination of viscosity of lubricating oil by Red Viscometer 1 or 2
10. Estimation of Ferrous iron by Dichrometry.
11. Determination of copper in by Iodometry.
12. Determination of calorific value of a fuel by bomb calorimeter

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

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Explain the functioning of instruments such as pH meter, conductivity meter and potentiometer.	L4
2. estimate Zn, Cr, Fe, Cu and other functional groups in various samples	L2
3. determine physical properties of liquids and synthesize polymers and nanomaterial's	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC14L.1	3	2	-	-	-	-	-	-	-	-	-	2
20AC14L.2	3	2	-	-	-	-	-	-	-	-	-	2
20AC14L.3	3	2	-	-	-	-	-	-	-	-	-	2

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

Title of the Course Communicative English Lab
Category HSMC
Course Code 20AC15L

Year I B. Tech.
Semester I Semester
Branch CE, ME, CSE & AIDAS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

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

Detailed Syllabus:

Pronunciation: **6**

Introduction to English speech sounds

Learning Outcome:

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

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

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

Learning Outcome:

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

- Adopt better strategies to listen attentively and comprehend attentively

Speaking **24**

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

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

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

Learning Outcomes:

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

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

Reading **6**

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

Learning Outcome:

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

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

Minimum Requirements:

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

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

Suggested Software:

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

Course Outcomes:

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

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC15L.1	-	-	-	-	-	-	-	-	-	2	-	1
20AC15L.2	-	-	-	-	-	-	-	-	-	1	-	2
20AC15L.3	-	-	-	-	-	-	-	-	3	3	-	3
20AC15L.4	-	-	-	-	-	-	-	-	3	2	-	1
20AC15L.5	-	-	-	-	-	-	-	-	1	3	-	3
20AC15L.6	-	-	-	-	-	-	-	-	-	2	-	1

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

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

Year I B. Tech
Semester I Semester
Branch CE, EEE, ME, ECE & CSE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

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

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

Data Types, constants, Input and Output and expressions

Exercise I: (week-1): Data types, Variables, Constants and Input and Output.
Exercise 2: (week-2): Operators, Expressions and Type Conversions.
Learning Outcomes: At the end of the unit, the student will be able to:

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

Decision control statements and Arrays

Exercise 3:(week-3): Conditional Statements [two way and multipath].
Exercise 4:(week-4): Loop Control Statements. [for, while and do-While]
Exercise 5:(week-5): Unconditioned JUMP Statements- break, continue, goto.
Exercise 6:(week-6): Declaring Arrays, Referencing Arrays, Array Subscripts. Using for loop for sequential Access.
Exercise 7:(week-7): Multidimensional Arrays
Learning Outcomes: At the end of the unit, the student will be able to:

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

Strings and Functions

Exercise 8:(week-8): String Basics, String Library Functions and Array of Strings.
Exercise 9:(week-9): Simple user defined functions, Parameter passing methods- pass by value, pass by reference.
Exercise 10:(week-10): Storage classes- Auto, Register, Static and Extern
Exercise 11:(week-11): Recursive Functions, Preprocessor commands.
Exercise 12:(week-12): Array Elements as Function Arguments.
Learning Outcomes: At the end of the unit, the student will be able to:

- Implement and test the programs on strings using string manipulation functions.

- Analyze programming problems to choose when regular loops should be used and when recursion will produce a better program

Pointers

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

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

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

Structures and Files

Exercise 14:(week-14): Structures

Exercise 15:(week-15): File handling

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

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

Prescribed Text Books:

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

Reference Books:

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

Course Outcomes:

At the end of the course, the 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	PSO1	PSO2	PSO3
20A511L.1	3	2	-	2	2	-	-	-	2	2	1	-	3	-	-
20A511L.2	2	2	-	-	-	-	-	-	1	-	-	-	3	-	-
20A511L.3	3	3	3	3	-	-	-	-	1	-	-	3	3	-	-
20A511L.4	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
20A511L.5	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-

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

Title of the Course	Environmental Science
Category	MC
Course Code	20AC16T
Year	I B. Tech
Semester	I Semester
Branch	CE, ME, CSE, AIDAS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	0

Course Objectives:

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

Unit 1 Multidisciplinary Nature of Environmental Studies 10

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

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

- Understand the importance of public awareness (L1).
- Identify various natural resources (L2).

Unit 2 Ecosystems, Biodiversity and its Conservation 10

Ecosystems: Producers, consumers and decomposers – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, lake ecosystem.

Biodiversity and Its Conservation: Definition – Value of biodiversity - Hot-spots of biodiversity – Threats to biodiversity – Conservation of biodiversity.

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

- Explain the concept of ecosystem (L2).
- Recognize the importance of biodiversity (L2).

Unit 3 Environmental Pollution 8

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

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

- Illustrate the different types of pollution (L2).
- Describe various sources, effects and control measures of pollution (L2).

Unit 4 Social Issues and the Environment 10

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

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

- Interpret social issues related to environment (L3).
- Relate importance of environmental acts (L4).

Unit 5 Human Population and the Environment 7

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

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

- Understand the effects of population explosion (L1).
- Identify the natural assets and their relationship (L2).

Prescribed Textbooks:

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

Reference Books:

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

Course Outcomes:

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

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC16T.1	1	1	-	-	-	3	3	1	-	-	-	3
20AC16T.2	1	2	-	-	-	3	3	1	-	-	-	3
20AC16T.3	1	1	-	-	-	3	3	1	-	-	-	3
20AC16T.4	1	1	-	-	-	3	3	1	-	-	-	3
20AC16T.5	1	1	-	-	-	3	3	1	-	-	-	3

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

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

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

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

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

Unit 1 Linear differential equations of higher order with constant coefficients 10
Definitions-complete solution-operator D-rules for finding complimentary function-inverse operator-rules for finding particular integral for RHS term of the type e^{ax}, $\sin ax / \cos ax$, polynomials in x, $e^{ax}\sin ax / e^{ax}\cos ax / e^{ax}x^n, x\sin ax / x\cos ax$ -method of variation of parameters.
Learning Outcomes: At the end of the unit, the student will be able to
- Identify the essential characteristics of linear differential equations with constant coefficients(L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)

Unit 2 Equations reducible to Linear Differential Equations 8
Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications**:** Electrical Circuits – L-C and L-C-R Circuit problems.\
Learning Outcomes: At the end of the unit, the student will be able to
- Classify and interpret the solutions of linear differential equations(L4)
- Generalize and solve the higher order differential equation by analyzing physical situations(L3)

Unit 3 Partial Differential Equations 8
Formation of PDEs by eliminating arbitrary constants and arbitrary functions, solutions of first order linear and non-linear PDEs using Charpit's method, solutions of boundary value problems by using method of separation of variables.
Learning Outcomes: At the end of the unit, the student will be able to
- Apply the techniques to find solutions of standard PDEs (L3)
- Solve the boundary value problems (L3)

Unit 4 Vector Differentiation 8
Scalar and vector point functions, vector operator Del, Del applied to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl- del applied twice to scalar point function, vector identities.
Learning Outcomes: At the end of the unit, the student will be able to
- Apply del to Scalar and vector point functions(L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl(L2)

Unit 5 Vector integration 10
Line integral-circulation-work done, surface integral, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.
Learning Outcomes: At the end of the unit, the student will be able to
- Find the work done in moving a particle along the path over a force field(L1)

- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals(L3)

Prescribed Textbooks:

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

Reference Books:

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

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Solve the differential equations related to various engineering fields	L3
2. Generalize 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. Understand the physical meaning of different operators such as gradient, curl and divergence	L2
5. Find the work done against a field, circulation and flux using vector calculus	L3

CO-PO Mapping:

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

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

Title of the Course Engineering Physics
Category BSC
Course Code 20AC24T

Year I B. Tech.
Semester II Semester
Branch CE & ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
- To impart knowledge in basic concepts of mechanics, acoustics, and ultrasonics with their engineering applications
- To explain the significant concepts of dielectrics and magnetic materials in the field of engineering and their potential applications.
- To impart knowledge in basic concepts of LASERs and optical fibers along with its engineering applications.

Unit 1 Mechanics **9**

Gradient of scalar, Divergence and Curl of vector field and their physical significance-rotational frames-conservative forces- F = - grad V, torque and angular momentum - Newton's laws in inertial and non-inertial frames of reference-rotating frame of reference with constant angular velocity-qualitative explanation of Foucault's pendulum-rigid body-angular velocity vector-centre of mass- gravitation law and Kepler's laws(qualitative).

Learning Outcomes: At the end of the unit, the student will be able to:
- Identify forces and moments in mechanical systems using scalar and vector techniques. (L3)
- Interpret the equation of motion of a rigid rotating body (torque on a rigid body). (L3)
- Extend Newton's second law for inertial and non-inertial frame of reference. (L2)

Unit 2 Acoustics and Ultrasonics **9**

Acoustics: Introduction- reverberation-reverberation time-Sabine's formula- derivation using growth and decay method – Absorption coefficient and its determination –factors affecting acoustics of buildings and their remedies.

Ultrasonics: Introduction- Properties- Production of ultrasonics by magnetostriction and piezoelectric methods - acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, Medical applications – Sonogram.

Learning Outcomes: At the end of the unit, the student will be able to:
- Explain how sound is propagated in buildings. (L2)
- Analyze acoustic properties of typically used materials in buildings. (L4)
- Identify the use of ultrasonics in different fields. (L3)

Unit 3 Dielectric and Magnetic materials **10**

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

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

Learning Outcomes: At the end of the unit, the student will be able to:
- Explain the concept of dielectric constant and polarization in dielectric materials. (L2)
- Classify the magnetic materials based on susceptibility and their temperature dependence. (L2)
- Apply the concept of magnetism and magnetic devices. (L3)

Unit 4 LASERs and Fiber Optics 10

Introduction-characteristics of lasers-spontaneous and stimulated emission of radiation-Einstein's coefficients-population inversion-pumping mechanism-Ruby laser- He-Ne laser-semiconductor laser-applications of lasers. Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation- Acceptance angle -Numerical Aperture-Classification of fibers based on Refractive index profile & modes (step index and Graded index optical fibers)-attenuation and optical fiber losses-Block diagram of fiber optic communication- Medical Applications.

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

- Understand the basic concepts of laser light sources. (L2)
- Identify the Engineering applications of lasers. (L2)
- Classify optical fibers based on refractive index profile and mode of propagation and identify the applications of optical fibers in medical, communication and other fields. (L2)

Unit 5 Sensors 8

Sensors:(qualitative description only): Different types of sensors and applications; Strain and Pressure sensors- Piezoelectric, magneto strictive sensors, Fibre optic methods of pressure sensing; Temperature sensors - bimetallic strip, pyroelectric detectors, Hall-effect sensor, smoke, and fire detectors.

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

- Identify different types of sensors and applications. (L3)
- Explain physics behind the working principles of sensors. (L2)
- Select sensors for different type of applications. (L3)

Prescribed Textbooks:

1. D. Kleppner and Robert Kolenkow , "An introduction to Mechanics"-II -Cambridge University Press,2015
2. M. N. Avadhanulu & P. G. Kshirsagar, "A textbook of Engineering Physics"- S. Chand Publications, 2017
3. Ian R Sinclair, Sensors and Transducers, 3rd ed, Elsevier (Newnes), 2001

Reference Books:

1. K. Thyagarajan. "Engineering Physics"-Mc Graw Hill Publishing company Ltd, 2015.
2. M K Varma "Introduction to Mechanics"-Universities Press-2015.
3. D.K. Bhattacharya and A. Bhaskaran, "Engineering Physics"- Oxford Publications-2015

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Explain physics applied to solve engineering problems in mechanics.	L2
2. Apply the principles of acoustics for noise cancellation and explain the applications of ultrasonics in various engineering fields.	L3 & L2
3. Summarize the various types of polarization of dielectrics, classification of magnetic materials and the applications of dielectric and magnetic materials.	L2
4. Apply the lasers and optical fibre concepts in various applications.	L3
5. Identify the sensors for various engineering applications	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC24T.1	3	2	-	-	-	-	-	-	-	-	-	-
20AC24T.2	3	2	2	-	-	-	-	-	-	-	-	-
20AC24T3	3	2	2	-	-	-	-	-	-	-	-	2
20AC24T.4	3	2	2	-	-	-	-	-	-	-	-	2
20AC24T.5	3	2	2	-	-	-	-	-	-	-	-	2

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

Title of the Course Engineering Mechanics
Category ESC
Course Code 20A323T

Year I B. Tech
Semester II Semester
Branch Common to CE & ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
- To explain the effect of force and moment in the different engineering applications.
- To familiarize frictional forces in mechanical applications.
- To teach centre of gravity and moment of inertia of solids and surfaces.
- To understand the analysis of rigid bodies under dynamic conditions.

Unit 1 Introduction to Engineering Mechanics **8**

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

Learning Outcomes: At the end of the unit, the student will be able to
- Resolve the forces in mechanical systems (L2)
- Identify the moments and forces (L3)
- Draw free body diagram (L3)
- Demonstrate equilibrium of ideal system. (L2)

Unit 2 Analysis of Structures and Friction **9**

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

Learning Outcomes: At the end of the unit, the student will be able to:
- Identify different types of trusses. (L2)
- Analyze the plane trusses by method of joints and the method of sections. (L4)

Unit 3 Properties of Surfaces and Moment of Inertia **9**

Properties of Surfaces and Volumes: Centroid and center of gravity, derivation of centroids from first moment of area, centroids of composite sections, center of gravity of common volumes - cylinder, cone, sphere, theorem of Pappus-guldinus.
Moment of Inertia: Area moment of inertia of plane and composite shapes, parallel axis theorem, perpendicular axis theorem, polar moment of inertia, mass moment of inertia of common volumes -thin plates, thin rod, cylinder, cone, sphere, rectangular prism, radius of gyration.

Learning Outcomes: At the end of the unit, the student will be able to:
- Identify the centre of gravity of composite sections. (L3)
- Determine the centre of gravity of common solids. (L3)
- Determine moment of inertia for composite volumes. (L3)

Unit 4 Kinematics 8

Equations of motion for rigid bodies, constant and variable acceleration, rectilinear and curvilinear motion, motion under gravity -projectile motion, use of rectangular coordinates, tangential and normal coordinates,

radius of curvature, rotation of a rigid body about a fixed axis, introduction to plane motion.

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

- Write equations of motion for rigid bodies. (L3)
- Find velocity and acceleration in rectilinear and curvilinear motions (L4)
- Trace the path of projectile. (L3)

Unit 5 Kinetics and Ideal Systems 8

Kinetics: Principles of dynamics - Newton's Laws of motion, D'Alembert's principle in rectilinear translation, principle of work and energy.

Ideal Systems: Principle of conservation of energy, concept of power, conservation of linear and angular momentum, principle of momentum and impulse, impact - types of impact.

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

- Apply D'Alembert's principle in rectilinear translation. (L3)
- Estimate the work done by a force and work done by a couple. (L3)
- Relate principle of work and energy in dynamic systems. (L3)
- Make use of principle of momentum and impulse to dynamic bodies. (L4)

Prescribed Text Books:

1. A Nelson, Engineering Mechanics: Statics and Dynamics, McGraw Hill publications.
2. J.L.Meriam , L.G.Kraige , J.N.Bolton ,Engineering Mechanics-statics, Engineering Mechanics-Dynamics.
3. S SBhavikatti, Engineering Mechanics, New Age International.
4. RK Bansal , Engineering Mechanics, Laxmi Publications.

Reference Books:

1. Basudeb Bhattacharya., Engineering Mechanics, 2/e, Oxford University Press (India), 2015.
2. Irving Shames, G K M Rao, Engineering Mechanics: Statics and Dynam-ics, 4/e, Pearson, 2009
3. K L Kumar, Veenu Kumar, Engineering Mechanics, 4/e, Tata McGraw Hill, 2010.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Resolve forces and couples in mechanical systems	L3
2. Identify different types of trusses and analyze the plane trusses by method of joints and the method of sections	L2,L4
3. Identify the frictional forces and its influence on equilibrium	L3
4. Find the centre of gravity and moment of inertia for various geometric shapes	L3
5. Develop equations for different motions	L4
6. Determine the displacement, velocity and acceleration relations in dynamic systems	L4
7. Relate the impulse and momentum	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A323T.1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20A323T.2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20A323T.3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20A323T.4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
20A323T.5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20A323T.6	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20A323T.7	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Title of the Course Basic Electrical and Electronics Engineering
Category ESC
Course Code 20A223T

Year I B. Tech
Semester II Semester
Branch CE

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives:

- To impart the basic knowledge about fundamental laws and electric circuits.
- To understand the working of various DC Machines.
- To understand the working of various AC Machines.
- To know about various electronic devices.
- To understand the various electrical installations and measuring instruments

Unit 1 Fundamental Laws and Electrical Circuits **9**

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

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

- Understand the fundamental laws of Electrical Engineering. (L1)
- understand the Kirchhoff's laws (L1)

Unit 2 DC Machines **9**

DC Generator: Constructional Details of DC machine, Principle of operation, emf equation, types of generators, applications.

DC Motor: principle of operation, torque equation, types, losses and efficiency, applications, Brake test, Swinburne's test and Speed control methods.

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

- understand construction and operation of DC machines (L1)
- analyze the performance of DC machines (L3)
- know the speed control methods of DC motor (L1)

Unit 3 AC Machines **9**

1-Φ Transformer: Principle of operation, emf equation, losses, efficiency and regulation calculations using OC and SC tests. 3-Φ Alternator: Principle of operation of alternators-Regulation by synchronous impedance method. 3-Φ Induction Motor: Principle of operation of induction motor, Brake Test on 3-Φinduction motor.

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

- understand construction and operation of various AC machines (L1)
- analyze the performance of various AC machines (L3)

Unit 4 Diode and Transistor **9**

Diode: PN junction diode, symbol, v-i characteristics, applications, half wave, full wave and bridge rectifiers. Transistor: PNP and NPN transistor, characteristics of CE configuration.

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

- understand operating characteristics of PN junction diode (L1)
- know the applications of PN junction diode (L1)

- understand the operation of various types of BJTs (L1)
- understand operating characteristics of CE configuration of BJTs (L1)

Unit 5 Measuring Instruments and Electrical Installations 9

Introduction, Electrical and Electronic Instruments, Classification of Instruments, Multimeter, Function generator, CRO: Block diagram of CRO, Principle of CRT (Cathode Ray Tube), applications of CRO, voltage, current and frequency measurements using CRO.

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

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

- know the types of measuring instruments. (L1)
- understand the construction and operation of measuring instruments. (L1)
- know the various electrical installations (L1)

Prescribed Text Books:

1. V.K. Mehta, Principles of Electrical and Electronics Engineering. S. Chand & Co 2010.
2. T.Thyagarajan, Fundamentals of Electrical and Electronics Engineering. SciTech publications, 2011, 5th Ed
3. D. C. Kulshreshta, "Basic Electrical Engineering", McGraw Hill, 2009.
4. P.S.Dhogal "Basic Electrical Engineering with Numerical Problems" McGraw Hill, 2006.
5. A.Sudhakar and Shyammohan S Palli, "Circuits and Networks" McGraw Hill, 2018.

Reference Books:

1. M.S Naidu and S.Kamakshaiah, Introduction to Electrical Engineering. TMH Publications.
2. D.P Kothari and I.J Nagrath, Basic Electrical Engineering, TMH, 3rdEd.2010
3. Millman and Halkias, Electriconics devices and circuits
4. S.Salivahanan, N,Suresh Kumar, "Electronic Devices and Circuits" McGraw Hill, 2011.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Impart the basic knowledge about the Electric circuits.	L1
2. Understand the working of various DC Machines and analyze their performance.	L1,L4
3. Understand the working of various AC Machines and analyze their performance.	L1,L4
4. Know about various electronic devices.	L1
5. understand the various electrical installations and measuring instruments	L1

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A223T.1	2	2	-	2	-	-	-	-	2	-	2	-	2	2	2
20A223T.2	2	3	2	2	-	-	-	-	2	-	2	-	2	3	2
20A223T.3	2	3	2	2	-	-	-	-	2	-	2	-	2	3	2
20A223T.4	2	2	-	3	-	-	-	-	2	-	2	-	2	2	2
20A223T.5	2	2	1	3	-	-	-	-	2	-	2	-	2	2	2

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

Title of the Course Basic Mechanical Engineering
Category ESC
Course Code 20A325T

Year I B. Tech
Semester II Semester
Branch CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
- To introduce the students about the basic metal joining processes of mechanical engineering.
- To explore the different basic manufacturing processes and their operations.
- To introduce the components of IC engines and to explore working principles of air compressors.
- To understand the basic laws of thermo dynamics and principles of R&AC.
- To understand about different transmission systems and different earth moving machinery.

Unit 1 Metal Joining Processes: 08

Welding Processes: Introduction to welding, classification of welding processes, Oxyacetylene welding – equipment, welding fluxes and filler rods, Gas cutting, Introduction to arc welding – Manual metal arc welding. Submerged arc welding, TIG and MIG processes, soldering and brazing Importance, comparison and applications.

Learning Outcomes: At the end of the unit, the student will be able to:
- Have knowledge about metal joining processes through different welding operations. (L1)
- Understand the gas cutting operations. (L2)
- Understand the soldering and brazing operations (L2)

Unit 2 Manufacturing Processes & Machining operations 09

Manufacturing Process: Basic description of the manufacturing processes – Sand Casting, Forging, Rolling, Extrusion and their applications.

Description about working with block diagram of Lathe and its operations.

Basic Machining operations: Drilling, Milling and Grinding machines and its operations.

Learning Outcomes: At the end of the unit, the student will be able to:
- Understand the basic manufacturing processes through different operations. (L2)
- Understand the working principle of lathe machine and its operations. (L2)
- Understand the different machining operations. (L2)

Unit 3 IC Engines & Air compressors 08

Introduction, Classification and Main components of IC Engines, description and working of I.C. Engines – 4 stroke and 2 stroke engines – comparison.

Air Compressors: Working principles of air compressors – Reciprocating air compressor: single and multi-stage compression.

Learning Outcomes: At the end of the unit, the student will be able to:
- Understand the components and classifications of IC engines. (L2)
- Understand the working principles of air compressors. (L2)

Unit 4 Basics of Heat Transfer & Refrigeration and air conditioning 09

Basics of Heat Transfer – conduction, convection & Radiation, basic laws of thermo dynamics – zero, first, second

and third law.
Refrigeration and air conditioning: Terminology of refrigeration and air conditioning — Vapour compression and vapour absorption systems - Basic principles of air conditioning – Room air conditioning systems & Comfort air conditioning systems. Ducting – Different types of ventilation system.
Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the basic terminology of Heat transfer and laws of thermo dynamics. (L2)
- Understand the terminology of R&AC with different ducting types. (L2)

Unit 5 Transmission of power & Earth moving machines 08

Transmission of power: Belt, Rope, Chain and gear drive.
Earth moving machines and mechanical handling equipment – Bull dozers – Power shovels – Excavators – Concrete mixer – Belt and bucket conveyors.
Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the operations of transmission systems. (L2)
- Understand the working principles of earth moving machines and mechanical handling equipments. (L2)

Prescribed Text Books:

1. Manufacturing Technology: Vol. 1 - Foundry, Forming and Welding by Rao P.N., McGraw-Hill Education, ISBN: 9781259062575, 9781259062575
2. A Textbook of Thermal Engineering (Mechanical Technology), 15/e, ISBN: 9788121925730
3. R.S.Khurmi & J.K.Gupta, Theory of Mahines, S.Chand Publications, ISBN: 9788121925242

Reference Books:

1. Benjamin,J.,Basic Mechanical Engineering,Pentex Books,9th Edition,2018
2. Roy and Choudhary, Elements of Mechanical Engineering, Media Promoters &Publishers Pvt. Ltd., Mumbai.
3. Sawhney, G. S., Fundamentals of Mechanical Engineering, PHI
4. R.K.Rajput, Manufacturing Technology. Laxmi Publications, 2007
5. Hazrachoudary, Elements of workshop technology volume–1,IndianBook distributing company,Calcutta,2011
6. P L Ballaney, Theory of Machines, Khanna Publishers
7. Thomas Bevan, Theory of Machines, CBS

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the welding processes and working principles of different welding equipments.	L1, L2
2. Understand the different manufacturing processes and working principles of different machining equipments.	L1, L2
3. Understand the working principles of IC engines and air compressors.	L1, L2
4. Understand the laws of thermo dynamics and basic principles of air conditioning and methods of refrigeration.	L1, L2
5. Understand the operating principles of transmission systems and earth moving machinery.	L1, L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A325T.1	3	-	-	-	-	1	1	1	2	-	-	-	-	-	-
20A325T.2	3	-	-	-	-	1	1	1	2	-	-	-	-	-	-
20A325T.3	3	-	-	-	-	1	1	1	2	-	-	-	-	-	-
20A325T.4	3	-	-	-	-	1	1	1	2	-	-	-	-	-	-
20A325T.5	3	-	-	-	-	1	1	1	2	-	-	-	-	-	-

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

Title of the Course Basic Electrical and Electronics Engineering lab
Category ESC
Course Code 20A223L

Year I B. Tech
Semester II Semester
Branch ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To impart knowledge and practical exposure on various elements of electrical circuits, operational aspects of various electrical machines and electronic circuits.

List of experiments:

1. Pre-determination of efficiency of DC shunt Machine working as Motor as well as Generator(Swinburne's Test)
2. Determination of Performance Characteristics of DC Shunt Motor(Brake Test)
3. Speed Control of DC Shunt Motor(Armature Control Method and Field Control Method)
4. Determination of Performance Characteristics of Three Phase Squirrel Cage Induction Motor(Brake Test)
5. Predetermination of efficiency and regulation of Single Phase Transformer at different power factors(OC and SC test on single phase transformers)
6. Study of V-I Characteristics of PN junction Diode.
7. Determination of Ripple Factor and Regulation of Half Wave Rectifier with and without capacitive filter.
8. Determination of Ripple Factor and Regulation of Full Wave Rectifier with and without capacitive filter.
9. Study of Input and Output Characteristics of Bipolar Junction Transistor in Common Emitter Configuration.
10. Study of Cathode Ray Oscilloscope.(CRO)
11. Determination of V-I Characteristics of ZENER Diode.
12. Study of Frequency response of a single stage CE amplifier

Note: Perform any ten experiments

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Apply the conceptual knowledge of various electrical machines to understand their operation and control aspects through practical investigations.	L3
2. Apply the conceptual knowledge of semiconductor devices to analyze the electronic circuits through practical investigations.	L3
3. Apply ethics and norms of the engineering practices while exercising experimental investigations.	L3
4. Function effectively as an individual and as a member in a team.	L1
5. Communicate effectively in verbal and written forms.	L1

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A223L.1	3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
20A223L.2	3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
20A223L.3	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-
20A223L.4	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
20A223L.5	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-

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

Title of the Course Engineering & IT Workshop
Category ESC
Course Code 20A326L

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

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:
- To read and interpret job drawing, plan various operations and make assembly.
- To identify and select the hand tools and instruments used in various trades.
- To gain practical skills by performing the experiments in different trades of workshop.

Trade 1 Carpentry Shop 02
Two joints (exercises) from : Mortise and tenon T joint, Dove tail joint, Bridle T joint, middle lap T joint, Half Lap joint, cross lap joint, Corner Dovetail joint or Bridle Joint from soft wood stock.
Learning Outcomes: At the end of the unit, the student will be able to apply wood working skills in real world applications.

Trade 2 Sheet metal shop 02
Two jobs (exercises) from: Tapered Tray, cylinder, conical funnel from out of 22 or 20 guage G.I. sheet
Learning Outcomes: At the end of the unit, the student will be able to build different parts with metal sheets used in various appliances

Trade 3 Fitting shop 02
Two jobs (exercises) from: square Fit, V-Fit, Semi-circular fit, dove tail fit from M.S. stock
Learning Outcomes: At the end of the unit, the student will be able to apply fitting operations in various assemblies.

Trade 4 House-wiring 02
Two jobs (exercises) from: Parallel and Series, Two way switch, Tube –Light connection, Stair case connection.
Learning Outcomes: At the end of the unit, the student will be able to apply basic electrical engineering knowledge for house wiring practice.

Trade 5 Demonstration 01
Any one trade of Plumbing • Machine Shop • Metal Cutting • Soldering and Brazing
Learning Outcomes: At the end of the unit, the student will be able to get the basic awareness of any of trade demonstrated.

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

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

Course Outcomes:
At the end of the course, the student will be able to — Blooms Level of Learning
1. Apply wood working skills in real world applications. — L3

2. Build different parts with metal sheets used in various appliances. L3
3. Employ fitting operations in various assemblies. L3
4. Execute basic electrical engineering knowledge for house wiring practice. L3
5. Identify various operations and its applications from the demonstration. L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A326L.1	3	-	1	-	1	-	-	-	-	-	-	1	-	-	-
20A326L.2	3	-	1	-	1	-	-	-	-	-	-	1	-	-	-
20A326L.3	3	-	1	-	1	-	-	-	-	-	-	1	-	-	-
20A326L.4	2	-	1	-	1	-	-	-	-	-	-	1	-	-	-
20A326L.5	3	-	1	-	1	-	-	-	-	-	-	1	-	-	-

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

Title of the Course Engineering Physics Lab
Category BSC
Course Code 20AC24L

Year I B. Tech.
Semester II Semester
Branch CE & ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- Understand the role of Optical fiber parameters in engineering applications.
- Recognize the significance of laser and ultrasonic by studying its characteristics and its application in finding the particle size.
- Illustrate the semiconductor, magnetic and dielectric materials applications.
- Identify the various sensor applications.

List of Experiments

1. Determination of wavelength of LASER light using diffraction grating
2. Determination of particle size using LASER.
3. Determination of spring constant of springs using Coupled Oscillator
4. Determination of Hall voltage and Hall coefficient of a given semiconductor using Halleffect.
5. Determination of Dielectric constant of dielectric material using charging and dischargingofcapacitor.
6. Magnetic field along the axis of a circular coil carrying current.
7. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum)
8. Determination of hysteresis loss by tracing B-H Curve of ferromagnetic material.
9. Determination of the numerical aperture of a given optical fiber and hence to find its acceptance Angle
10. Measurement of magnetic susceptibility by Gouy's method
11. Determination of ultrasonic velocity in liquid (Acoustic grating)
12. Determination of pressure variation using Strain Guage sensor.
13. Determination of temperature change using Strain Guage sensor.
14. Determination of pressure variations using optical fiber sensors.
15. Determination of temperature changes using optical fiber sensors.

References:

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

Course Outcomes:

At the end of the course, student will be able to	Blooms Level of Learning
1. Understand the characteristics and behavior of various materials.	L2
2. Estimate the basic characteristic quantities of LASER and ultrasonics	L4
3. Exhibit an ability to use techniques and skills associated with modern engineering tools such as fiber optics and sensors.	L4 & L5
4. Measure properties of semiconductors, magnetic and dielectric materials.	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC24L.1	3	-	-	-	2	-	-	-	-	-	-	-
20AC24L.2	3	-	-	-		-	-	-	-	-	-	-
20AC24L.3	3	2	-	-	2	-	-	-	-	-	-	-
20AC24L.4	3	2	-	-	2	-	-	-	-	-	-	-

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

Title of the Course	Partial Differential Equations and Numerical Methods
Category	BSC
Course Code	20AC31T
Year	II B. Tech.
Semester	I Semester
Branch	CE, ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To introduce numerical methods for solving algebraic and transcendental equations.
- To notify the numerical methods in interpolation
- To explain various numerical methods for evaluating definite integrals.
- To introduce the numerical solutions of ordinary differential equations.
- To describe the applications of Partial differential equations

Unit 1 Solutions of algebraic and transcendental equations 10

Bisection method – Regula - Falsi method - The Iteration Method-Newton-Raphson method.

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

- Acquire the Knowledge of algebraic and transcendental equations (L1)
- Find approximate roots of an equation by using bisection, regula-falsi and Newton's methods (L3)

Unit 2 Interpolation 10

Finite differences - forward differences and backward differences - Newton's forward interpolation formula - Newton's backward interpolation formula - Lagrange's interpolation formula.

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

- Explain various discrete operators (L2)
- Apply Newton forward and Backward formula for equal intervals (L3)
- Apply Lagrange's interpolation formula for unequal intervals (L3)

Unit 3 Numerical Differentiation and Numerical integration 8

Numerical Differentiation, Numerical integration - Trapezoidal rule - Simpson's 1/3rd and Simpson's 3/8 rules.

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

- Find differentiation of a function by using different numerical methods (L3)
- Determine the integration of a function by using numerical integration (L3)

Unit 4 Numerical solutions of ordinary differential equations of first order 10

Picard's method -Taylor's series- Euler's method - Modified Euler's method - Runge-Kutta method of fourth order.

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

- Solve ordinary differential equations by using different numerical schemes (L3)
- Apply the knowledge of numerical methods to solve Engineering problems (L3)

Unit 5 Applications of Partial Differential Equations 10

Solution of 1D-wave - 1D-heat and 2D-Laplace equations in Cartesian coordinates by the Method of separation of variables

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

- Find the solution of partial differential equations bearing applications (L3)
- Solve the boundary value problems related to one dimensional wave equation and heat equations. (L3)

Prescribed Text Books:

1. R.K. Jain, S.R.K. Iyengar, Advanced Engineering Mathematics, 5/e, Narosa Publishers, 2016.
2. E. Kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.
3. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

Reference Books:

4. T. Veerarajan, Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. P. Kandasamy, K. Thilagavathi, K. Gunavathi, Numerical Methods, S. Chand & Company, 2/e, Reprint 2012.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Apply the knowledge of numerical methods to solve algebraic and transcendental equations.	L3
2. Apply the knowledge of interpolation	L2
3. Understand the techniques of numerical differentiation and Integration	L2
4. Solve the ordinary differential equations using numerical methods	L3
5. Solve the boundary value problems (related to heat, one dimensional wave equation.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC31T.1	3	3	-	-	-	-	-	-	-	-	-	3
20AC31T.2	3	3	-	-	-	-	-	-	-	-	-	3
20AC31T.3	2	2	-	-	-	-	-	-	-	-	-	2
20AC31T.4	3	3	-	-	-	-	-	-	-	-	-	3
20AC31T.5	3	3	-	-	-	-	-	-	-	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Business Administration

Title of the Course	Managerial Economics and Financial Analysis
Category	HSMC
Course Code	20AC35T
Year	II B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To understand the concepts and tools of economic analysis.
- To apply concepts in real life by developing problem solving skills there exists a relationship between Managerial Economics and Financial Accounting.
- To focus on picking up the basics of accounting such as Accounting Data and Financial Statements, which constitute the language of Business.
- The student is exposed and made familiar with journalizing, interpretation and use of Accounting Data

Unit 1 Introduction to Managerial Economics and Demand Analysis 12

Managerial Economics: Meaning and Nature, Definition, Scope, relationship with other areas. **Demand Analysis**: Definition and types of Demand, Demand Determinants, and Law of Demand and its exceptions, Elasticity of Demand-types, measurement and Significance, Demand forecasting methods.

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

- Remember the scope and relationship with other areas of Managerial Economics. (L1)
- Explain types of demand and demand forecasting methods. (L2)

Unit 2 Production and Cost Analysis 10

Production: Production Function, Cobb-Douglas Production function, Iso-quants and Iso-costs, MRTS, Least Cost Combination of Inputs, Laws of Returns, Internal and External Economies of Scale. **Cost Analysis**: Cost concepts, Determinants of cost, cost-output relationship in short run and Long run. **Break-Even Analysis (BEA):** Objectives, Assumptions, Importance, Graphical representation, Limitations, simple numerical problems.

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

- Remember production function and economies of Scale. (L1)
- Differentiate cost concepts. (L4)
- Explain BEP concepts in practically. (L1)

Unit 3 Market Structure and Forms of Business Organizations 12

Markets: Perfect market, imperfect market- Monopoly, Monopolistic and Oligopoly Markets. Price-output determination in perfect competition and monopoly in long run and short run. **Forms Of Business Organizations**: Definition, Forms of Business Organizations-Private Sector-sole proprietorship, Partnership, Joint Hindu family business, co-operative societies, joint stock companies. **Public Sector**- Departmental organizations, public corporations, government companies.

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

- State the functions of different forms of business organizations. (L1)
- Define Perfect market, imperfect market- Monopoly, Monopolistic and Oligopoly Markets (L1)

Unit 4 Capital and Capital Budgeting 10

Capital: Definition of Capital and its significance, Types of Capital, Sources of raising Capital. **Capital Budgeting**: Definition, Nature and scope of capital budgeting, features of capital budgeting, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method, Profitability Index Method (Simple Problems).

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

- Remember types and Sources of raising Capital. (L1)
- Compare and select techniques of Investment Analysis. (L4)

Unit 5 Introduction to Financial Accounting and Analysis 10

Financial Accounting: Accounting definition, Principles of accounting, Book Keeping, Journal, Ledger, Trial Balance, Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).
Financial Analysis: Definition of Financial Analysis, Ratios and its significance- types- liquidity Ratios, turnover Ratios - solvency Ratios and profitability ratios

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

- Understand Financial Accounting Concepts (L1)
- Use Financial Accounting and Analysis in practical life (L3)

Prescribed Textbooks:

1. Gupta: Managerial Economics, TMH, 2009
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003
3. Mehta P.L., Managerial Economics-Analysis, Problems, Cases, S Chand and Sons,New Delhi, 2001.
4. M.E. Thukaram Rao., Accounting for Managers, New Age International Publishers.
5. T.S, Reddy and Y. Hari Prasad Reddy, Accounting and Financial Management, Margham Publications.

Reference Books:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Edition.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.
5. Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Predict the demand for a product or product mix of a company and to analyze various factors influencing demand elasticity.	L1
2. Assess the cost behavior, costs useful for managerial decision making and determine Break Even Point (BEP) of an enterprise.	L2
3. Differentiate private and public sector undertakings in their promotion, incorporation, regulation, administration, legal formalities and existence.	L2
4. List features, steps, merits, uses & limitations of Pay Back, ARR, NPV, PI and IRR methods of Capital Budgeting and compute rank of the projects.	L3
5. Analyze, interpret and comment on the financial statements of a business enterprise by using liquidity leverage, coverage and turnover & profitability ratios.	L3 & L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AC35T.1	2	-	-	-	2	-	2	-	-	-	-	-	-	-	-
20AC35T.2	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
20AC35T.3	2		1	-	2	-	-	-	-	-	2	-	-	-	-
20AC35T.4	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
20AC35T.5	2	2	-	-	-	-	2	-	-	-	-	-	-	-	-

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

Title of the Course	Advanced Surveying
Category	PCC
Course Code	20A131T
Year	II B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To ensure that the student develops knowledge of the basic and conventional surveying instruments, principles behind them, working of the instruments, plotting of the area from the field measurements, determination of the area and the theory behind curves.
- To ensure that the student develops knowledge in the working of advanced instruments, setting out of curves from the field measurements and basic knowledge on remote sensing.

Unit 1 Linear Measurements and Chain Surveying 10

Principle – Classification - Accuracy and errors - Linear measurements – Direct measurements - Instruments for chaining – Ranging out survey lines – Errors in chaining – Tape corrections - Chain triangulation -Field book - Instruments for setting right angles - Basic problems in chaining - Obstacles for chaining.

Compass: Compass Survey: Types of compass – Bearings - Included angles– Declination - Dip and local attraction.

Plane Table Survey: Components – Setting – Methods – Radiation– Traversing - Intersection and Resection.

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

- To take accurate linear measurements. (L4)
- To use various compasses to take bearings. (L4)
- Apply the basics of Plane Table Surveying to draw the boundaries. (L4)

Unit 2 Leveling and Contouring 10

Types of levels - Dumpy level and tilting level - Temporary and permanent adjustments - Height of instrument and rise and fall methods - Effect of curvature and refraction - Characteristics of contours - Direct and indirect methods of contouring and plotting of contours - Uses of contour maps.

Computation Of Areas And Volumes: Areas: Areas dividing into number of triangles - By offsets to a base line - By latitudes and departures (D.M.D. and D.P.D) – By coordinates - Areas from maps. Volumes : Volume from cross-section - Embankments and cutting for a level section and two level sections with and without transverse slopes

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

- Apply leveling to determine the difference on heights of different features. (L3)
- Compute areas and volumes in a surveying back drops. (L3)

Unit 3 Theodolite 10

Description and uses of vernier micrometer – Micro-optic theodolites – Temporary and permanent adjustments of vernier transit – Measurement of horizontal and vertical angles – Heights and distances – Traversing – Closing error and distribution – Gale's traverse table – Omitted measurements.

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

- Learn about the applications of different types of theodolites. (L4)
- Determine vertical and horizontal angles using theodolites. (L4)

Unit 4 Tacheometric Surveying 9

Tacheometric Surveying: Principle of stadia method – Distance and elevation formulae for staff held vertical – Instrumental constants – Anallactic lens – Tangential method – Use of subtense bar –Tachometric contouring.

Curve Surveying: Types of curves - Linear and angular methods of setting out of simple curves – By offsets from long chord – By offsets from tangents - By successive bisection of arcs of chords – By offsets from chords produced – Two Theodolite methods, Introduction to EDM and DEM, basic concepts & total station

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

- Use the tachometry to determine the horizontal and vertical distance of an object from the station. (L4)
- Understand the method of setting out simple curves. (L4)
- Know various methods to set out curves. (L4)

Unit 5 Photogrammetric Surveying 12

DGPS- ground radar penetration survey- safe alignment, existing alignment, Total station-drone based surveying-software's used in surveying.

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

- Understand the usage of software. (L3)
- To know about safe alignment. (L3)

Prescribed Text Books:

1. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Surveying - Vol. I, II and III, 15th Edition, Laxmi
2. S. K. Duggal, Surveying - Vol. I and II, 3rd Edition, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2010.

Reference Books:

1. R. Subramanian, Surveying and Leveling, 1stEdition, Oxford University Press, New Delhi, 2010.
2. Arthur R. Benton and Philip J. Taety, Elements of Plane Surveying, 3rd Edition, McGraw Hill, 2010.
3. Arora, K. R., Surveying - Vol. I, II and III, 10th Edition, Standard Book House, Delhi, 2011
4. Chandra, A.M, Plane Surveying, 2nd Edition, New Age International Publishers, New Delhi, 2010.

Course Outcomes:

At the end of the course,	Blooms Level of Learning
1. The students would be able to do temporary and permanent adjustments of survey instruments.	L4
2. The students would be able to measure distances and angles.	L3
3. The students would be able to orient and draw the various maps.	L4
4. The students would be able to calculate areas and volumes of the earth work.	L4
5. The student would be able to undertake various civil engineering surveys and convert the data into usable forms	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A131T.1	1	-	-	2	-	3	-	-	-	-	-	1	1	1	-
20A131T.2	1	2	-	3	-	-	-	-	-	-	-	-	1	1	-
20A131T.3	1	2	-	-	-	-	-	-	-	-	-	1	1	1	-
20A131T.4	1	-	-	2	-	3	-	-	-	-	-	1	1	1	-
20A131T.5	1	2	-	3	-	-	-	-	-	-	-	1	1	1	-

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

Title of the Course	Strength of Materials
Category	PCC
Course Code	20A132T
Year	II B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To enable the student to familiarize about basic properties of materials.
- To train the students to compute shear stresses and bending stresses in different cross-sections.
- To enable the student to draw shear force and bending moment diagrams for different types of beams.
- To demonstrate analytical methods for determining deflection of beams
- To teach the student with basic concepts for determination of principal stresses and strains in various structural elements and to analyze failure mechanisms

Unit 1 Simple Stresses and Strains 12

Concept of stress and strain- - Elasticity and Plasticity –Types of stresses and strains – Hooke's law–stress – strain diagram for mild steel– Working stress –Factor of safety –Lateral strain, Poisson's ratio and volumetric strain –Elastic moduli and the relationship between them– Bars of varying section –composite bars– Temperature stresses.

Strain energy –Resilience –Gradual, sudden, impact and shock loadings –simple applications.

Learning Outcomes: At the end of the unit, the student will be able to learn. (L4)

- The concepts of stress and strain and methods of measurements. (L4)
- Other loaded behavior of materials.

Unit 2 Shear Force and Bending Moment 10

Definition and classification of beams– Concept of shear force and bending moment– S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, UDL, UVL and combination of loads– Point of contra flexure –Relation between S.F, B.M and rate of loading at a section of a beam.

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

- Calculate bending moments and shear forces for various loading conditions and supports. (L3)
- Draw SFD and BMD for various loading conditions. (L3)

Unit 3 Flexural Stresses & Shear Stresses 10

Flexural stresses: Theory of simple bending –Assumptions –Derivation of bending equation: M/I =f/y = E/R Neutral axis– Determination of bending stresses– section modulus of rectangular and circular sections (Solid and Hollow), I, T, L & Channel sections –Design of simple beam sections.

Shear stresses: Derivation of formula– Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T., L & Channel sections.

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

- Understand the flexural behaviour of various materials and the effect of their geometry capacities. (L4)
- Apply their knowledge to design various beam sections. (L4)

Unit 4 Deflection of Beams 14

Bending in to a circular arc– slope, deflection and radius of curvature –and Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, -UDL, double integration method- Macaulay's

methods -Mohr's theorems –Moment area method.

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

- Determine the deflection and slopes on various beams and different loading conditions. (L4)

Unit 5 **Basics of Principal Stresses and Strains & Theories of Failures with Simple Problems** **12**

Principal stresses and strains: Introduction– Stresses on an inclined section of a bar under axial loading– compound stresses– Normal and tangential stresses on an inclined plane for biaxial stresses– Two perpendicular normal stresses accompanied by a state of simple shear– Mohr's circle of stresses– Principal stresses and strains –Analytical and graphical solutions.

Theories of failures: Introduction– Various Theories of failures like Maximum Principal stress theory– Maximum Principal strain theory–Maximum shear stress theory– Maximum strain energy theory –Maximum shear strain energy theory.

Thin shells and thick shells, columns (introduction)-no analytical questions

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

- Understand principal stresses and various planes of action of stress. (L3)
- Know various failure theories and their application. (L3)

Prescribed Text Books:

1. Mechanics of Materials – Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi publications.
2. Strength of Materials by R. Subramaniyan, Oxford University Press.
3. Strength of materials by Dr. R. K.Bansal – Laxmi publications.

Reference Books:

1. Mechanics of Solids, by Ferdinand Beer and others– Tata Mc. Graw hill Publications2000
2. Strength of materials by R. K. Rajput, S. Chand & Co, New Delhi.
3. Strength of Materials by S. Ramakrishna and R. Narayan– Dhanpat Rai Publications.
4. Strength of Materials by Schaum's outline series –Mc Graw hill International Editions.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Calculate stresses and strains	L4
2. Calculate Shear Force and Bending moments and draw their diagrams	L3
3. Apply the concepts of Flexure and Shear on different members.	L4
4. Determine the deflections induced by different types of loads	L4
5. Determine the principal planes of failure.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A132T.1	1	-	-	1	-	-	-	-	-	-	-	1	1	1	-
20A132T.2	1	1	-	1	-	-	-	-	-	-	-		1	1	-
20A132T.3	1	1	-	-	-	-	-	-	-	-	-	1	1	1	-
20A132T.4	1	-	-	1	-	-	-	-	-	-	-	1	1	1	-
20A132T.5	1	1	-	1	-	-	-	-	-	-	-	1	1	1	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCE
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Department of Civil Engineering

Title of the Course	Fluid Mechanics and Hydraulic Engineering
Category	PCC
Course Code	20A133T
Year	II B. Tech
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To impart knowledge on basics of Fluid Mechanics and properties of fluids
- To teach the concepts of Fluid statics
- To impart knowledge on Fluid Kinematics and Fluid Dynamics
- To impart knowledge on Flow through pipes and Dimensional Analysis and hydraulic similitude
- To impart knowledge on Hydraulic machines and pumps

Unit 1 Basic Concepts and Definitions 10

Distinction between a fluid and a solid; Dimensions and Units; Fluid properties - Density, Specific Weight, Specific Gravity, Specific volume, Kinematic and dynamic viscosity, Vapor Pressure, Cohesion, Adhesion, Surface tension, Capillarity, Bulk Modulus of Elasticity, Compressibility; Types of fluids-Ideal and real fluids, Newtonian and non-Newtonian fluids, Rheological behavior of fluids.

Fluid statics: Fluid Pressure; Pressure at a point; Hydrostatic law; Pascal's law; Atmospheric, Gauge and Absolute pressure; Equation of state; Measurement of pressure-Manometers, Hydrostatic forces on submerged plane and curved surfaces-Total pressure and Centre of Pressure; Practical applications-Dams, Gates, Buyoyancy; Buyoyant force, Centre of Buoyancy

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

- Differentiate between Newtonian and non-Newtonian fluids (L2)
- Know about Atmospheric pressure, Gauge pressure and Absolute pressure. (L2)
- Solve Problems involving the hydrostatic forces acting on the dams and gates(L2)

Unit 2 Fluid Kinematics 10

Classification of fluid flow-Steady and Unsteady flow, Uniform and Non-uniform flow, Laminar and Turbulent flow, Rotational and Irrotational flow, One, two and three dimensional flows; Stream line, Path line and stream tube, Velocity, Acceleration and rotation of fluid particles derivation of continuity equation-one-dimensional, three dimensional; stream function, velocity potential; Flow net-Methods, uses.

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

- Know about Atmospheric pressure, Gauge pressure and Absolute pressure. (L4)
- Study the manometers for measuring the pressure at different points. (L4)
- Solve Problems involving the hydrostatic forces acting on the dams and gates. (L4)

Unit 3 Fluid Dynamics 10

Euler's Equation, Bernoulli's Equation, Applications of Bernoulli's equation-Venturimeter, Orifice Meter and Pitot tube, Momentum equation, Momentum correction factor, Applications of momentum equation.

Weirs and notches: Flow over Notches and Weirs: Types of Notches and Weirs; Flow over - Rectangular Sharp-crested, Triangular, Trapezoidal Notches and Weirs; Broad-crested Weirs; Submerged Weirs; Proportional Weirs.

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

- Understand the Fluid kinematics. (L4)
- understand the Fluid Dynamics. (L4)
- apply Bernoulli's equation-Venturimeter, Orifice Meter and Pitot tube. (L4)

Unit 4 Flow through pipes 10

Reynold's experiment, energy losses-major and minor losses; Laws of fluid friction; Darcy-weisbach equation, Hydraulic Grade Line and Total Energy Line; Pipes in series and parallel; Equivalent pipe, Branched pipe, Siphon, Water Hammer in pipes

Laminar flow, Laminar flow through circular pipes-Hazen poiseuille law; Laminar flow between parallel plates-Both plates at rest, one plate moving and other at rest

Turbulent flow, Hydrodynamically smooth and rough boundaries, resistance to flow of fluid in smooth and rough pipes, Moody's diagram

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

- Understand the major and minor losses. (L5)
- Solve the problems relating pipes in series and parallel. (L5)
- Understand the laminar and turbulent flows. (L5)

Unit 5 Hydraulic Turbines and Pumps 10

Layout of a typical hydropower installation-Heads and efficiencies-classification of turbines-Pelton wheel-Francis turbine-Kaplan turbine-working, working proportions- Velocity diagrams-Work done and efficiency-Hydraulic design, Surge tanks, Cavitation, causes and effects

Centrifugal pumps: pump installation details-Classification-Heads-Losses and efficiencies-Limitation of suction lift-Work done-Minimum starting speed-Specific speed-Multistage pumps-Pumps in parallel-Performance of pumps-Characteristic curves-Net Positive Suction Head-Priming devices

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

- Understand the concepts of Hydraulic turbines. (L5)
- Find Work done and efficiency of turbines. (L5)
- Understand the Centrifugal pumps. (L5)
- Understand the priming of devices. (L5)

Prescribed Text Books:

1. P.M.Modi and S.M.Seth, Hydraulics and Fluid Mechanics, Standard book house
2. D.S.Kumar Fluid Mechanics and Fluid Power Engineering, Kataria & sons
3. R.K.Bansal Fluid Mechanics and Hydraulic Machines, Laxmi Publications

Reference Books:

1. Rajput, Fluid mechanics and fluid machines, S.Chand & co
2. Fluid Mechanics and Hydraulic machines by Sukumar Pati, Tata Mc Graw Hill
3. Fluid Mechanics and Hydraulic Machines by N.Narayana Pillai, Universities Press

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. understand the fundamentals of Fluid Mechanics	L2
2. understand the measurement of fluid pressure by manometers	L4
3. understand the applications of Bernoulli's equation Venturimeter, Orifice meter and Pitot tube	L4
4. solve the problems of flow through pipes and	L5
5. demonstrate practical knowledge of turbines and pumps.	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A133T.1	1	2	3	1	-	-	-	-	-	-	-	-	2	3	-
20A133T.2	1	2	3	3	-	-	-	-	-	-	-	-	2	3	-
20A133T.3	1	2	3	3	3	-	-	-	-	-	-	-	2	3	-
20A133T.4	1	2	3	3	3	-	-	-	-	-	-	-	2	3	-
20A133T.5	1	2	3	3	-	-	-	-	-	-	-	-	2	3	-

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

Title of the Course	Advanced Surveying Lab
Category	PCC
Course Code	20A131L
Year	II B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To impart the practical knowledge in the field, it is essential to introduce in curriculum.
- Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.

List of Experiments **40**

1. Survey of an area by chain survey (closed traverse) & Plotting
2. Chaining across obstacles
3. Determination of distance between two inaccessible points with compass.
4. Survey of a given closed area by prismatic compass and plotting after adjustment.
5. Radiation method, intersection methods by plane table survey
6. Two point and three point problems in plane table survey
7. Fly leveling (differential leveling)
8. Two exercises on contouring.
9. Study of Theodolite in detail - measurement of horizontal and vertical angles.
10. Measurement of horizontal angles by method of repetition and reiteration.
11. Height of the building using total station
12. Area of the building using total station.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Calculate angles, distances and levels.	L2
2. Identify data collection methods and prepare field notes	L3
3. Determine the location, area and volume of objects on ground surface	L5
4. Record the reduced levels using various methods of leveling	L6
5. Record the reduced levels using various methods of leveling and measurement of horizontal & vertical angles by Theodolite	L6

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A131L.1	1	3	3	-	-	3	-	-		2	3	-	1	1	-
20A131L.2	2	3	3	2	-	-	1		1	2	1	-	1	1	-
20A131L.3	3	-	-	-		-	-	-	-	-	-	-	-	-	-
20A131L.4	3	2	-	-	2	-	-	-	-	-	-	-	-	-	-
20A131L.5	3	-	-	-		-	-	-	-	-	-	-	-	-	-

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

Title of the Course Strength of Materials Lab
Category PCC
Course Code 20A132L

Year II B. Tech.
Semester I Semester
Branch CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- The objective of the course is to make the student to understand the behavior of materials under different types of loading for different types structures.

List of Experiments 40

1. Tension & Shear test on mild steel / HYSD bar
2. Compression test
3. Compression test &Tension test on coiled spring
4. Brinell and Rockwell hardness tests
5. Charpy and Izod impact tests
6. Bending test on simply supported beam
7. Bending test on cantilever beam
8. Bending test on fixed beam
9. Bending test on continuous beam
10. Verification of Maxwell's reciprocal theorem
11. Bending test on carriage spring
12. Torsion test on Mild Steel bar.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Conduct tension, compression, torsion and shear tests on materials	L3
2. Determine hardness of metals & flexural strength of various beams	L2,L3
3. Verification of Maxwell's reciprocal theorem	L2
4. Conduct bending test on carriage spring	L3
5. Torsion test on Mild Steel bar.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A132L.1	3	3	-	-	3	-	-	-	-	2	3	-	-	-	-
20A132L.2	3	3	2	-	3	-	-	1	-	2	1	-	-	-	-
20A132L.3	2	2	2	2	2	-	2	-	2	-	-	2	2	2	2
20A132L.4	2	2	2	2	2	-	2	-	2	-	-	2	2	2	2
20A132L.5	2	2	2	2	2	-	2	-	2	-	-	2	2	2	2

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

Title of the Course Fluid Mechanics Lab
Category PCC
Course Code 20A134L

Year II B. Tech.
Semester I Semester
Branch Civil Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- The objective of the course is to make the student to understand the fluid flow concepts and get familiar with flow measuring devices.

List of Experiments **40**

1. Calibration of venturi meter.
2. Calibration of orifice meter,
3. Determination of coefficient of discharge for a small orifice by a constant head method.
4. Determination of coefficient of discharge for a mouth piece by variable head method.
5. Calibration of rectangular and triangular notch.
6. Calibration of triangular & trapezoidal weir.
7. Determination of coefficient of loss of head due to minor loss.
8. Determination of head loss due to major loss.
9. Verification of Bernoulli's equation.
10. Reynold's experiment.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Possess a solid foundation in fluid flow principles.	L2
2. Analyse a variety of practical fluid flow devices and utilize fluid	L3,L4
3. Determination of coefficient of loss of head due to minor loss	L3
4. Determination of head loss due to major loss	L3
5. Determination of coefficient of discharge for a mouth piece by variable head method	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A134L.1	3	3	-	-	3	-	-	-	-	2	-	-	-	-	-
20A134L.2	3	3	2	-	3	-	-	1	-	2	-	2	-	-	-
20A134L.3	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
20A134L.4	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
20A134L.5	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-

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

Title of the Course	Life Sciences for Engineers
Category	MC
Course Code	20AC34T
Year	II B. Tech.
Semester	I Semester
Branch	CSE, CE, AIDS & AIML

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	0

Course Objectives:

- To introduce the origin of life.
- To provide the basis for classification of living organisms.
- To describe the transfer of genetic information**.**
- To introduce the techniques used for modification of living organisms**.**
- To describe the applications of biomaterials

Unit 1 The Living World **8**

Nature and Scope of Biology,Origin and Evolution of Life, Systematics, Classification of living organisms, Viruses, Prokaryotes and Eukaryotes.

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

- Explain the concept of origin of life. (L2)
- Classify the different types of organisms. (L2)

Unit 2 Cell and Cell Division **8**

Plant cell and Animal cell, Structure of the cell: Nucleus, Ribosome's. Molecules of the cell: Nucleic acids, Cell Cycle: Mitosis, Meiosis.

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

- Discusses the structure and function of the cell. (L2)
- Differentiate the stages of cell division. (L2)

Unit 3 Physiology of Plants and Animals **12**

Photosynthesis, Respiration: Types of respirations, Glycolysis, TCA Cycle, Nervous system,Endocrine system in animals.

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

- Describe the importance of photosynthesis and respiration process. (L1)
- Explain the vital role of Co-ordinate system in animals. (L2)

Unit 4 Genetics **12**

Genetic basis of Inheritance, Mendel's laws, Human genetic disorders: Hemophilia, Colour Blindness, Autosomal abnormalities: Down's, Patau's and Edward's syndromes. Genetic Engineering: Recombinant vaccines, Basis of DNA finger Printing, Animal cloning.

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

- Define the gene and its importance in heredity. (L1)
- Describe the effects of gene mutations. (L2)
- Apply the concept of genetic engineering in development of vaccines. (L3)

Unit 5 Biology in Human Welfare 8

Parasitism, Plasmodium vivax, Wuchereria bancrofti, Health and Disease: Bacterial, Viral diseases:HIV, Biomedical technologies: X-Ray, CT- Scan, MRI- Scan, PET-Scan.

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

- Identify the causes of pathogenic diseases and effects on human health. (L1)
- Explain the importance of biomedical techniques. (L2)

Prescribed Textbooks

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
4. PS Verma | VK Agarwal.Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand Publishing, 2004.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Explain stages of Systematics.	L2
2. Summarize application of biomolecules.	L2
3. Identify DNA as a genetic material in the molecular basis of information transfer.	L3
4. Analyze biological processes at the Genetic Engineering.	L4
5. Identify the potential of recombinant DNA technology.	L3

CO-PO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC34T.1	2	2	-	-	-	2	-	-	-	-	-	2
20AC34T.2	2	2	-	-	-	2	-	-	-	-	-	2
20AC34T.3	3	3	-	-	-	3	-	-	-	-	-	3
20AC34T.4	3	3	-	-	-	3	-	-	-	-	-	3
20AC34T.5	2	2	-	-	-	2	-	-	-	-	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES::RAJAMPET
(An Autonomous Institution)
Department of Computer Science and Engineering

Title of the Course	Python Programming
Category	SC
Course Code	20A535L
Year	II B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practical	Credits
1	0	2	2

Course Objectives:
- 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 apply module design and usage of text files in python programming

Module 1 **Theory Hours: 4, Practice sessions: 6**
Introduction to python programming language, literals, variables and identifiers, operators, expressions and data types. Control Structures: Boolean expressions, selection control, and iterative control.
Learning Outcomes: At the end of the unit, the student will be able to
- Understand the importance of python programming (L2)
- remember control structures and use them in the python programs (L2)

Module 2 **Theory Hours: 3, Practice sessions: 06**
Lists: List structures, lists in python, iterating over lists in python, more on python lists. Dictionaries and sets, tuple.
Learning Outcomes: At the end of the unit, the student will be able to
- Construct python programs using list type (L3)
- Demonstrate programs on dictionaries and sets, tuple. (L3)

Module 3 **Theory Hours: 4, Practice sessions: 06**
Functions: Program routines, more on functions, Module Design: Modules, Top-Down design, python modules
Learning Outcomes: At the end of the unit, the student will be able to
- illustrate the importance of module and use them (L3)
- infer programs on text files (L4)

Module 4 **Theory Hours: 3, Practice sessions: 06**
Text Files: Text File, Using Text files, string processing, exception handling
Learning Outcomes: At the end of the unit, the student will be able to
- describe about text files and use in python programs (L3)
- analyze string processing and exception handling in programming (L4)

Module 5 **Theory Hours: 4, Practice sessions: 06**
Introduction to Object oriented programming: class, three fundamental features of object oriented programming, encapsulation-what is encapsulation, defining classes in python. Inheritance: subtypes, defining subclasses in python, Polymorphism: use of polymorphism.
Learning Outcomes: At the end of the unit, the student will be able to
- describe the fundamentals of object oriented programming (L3)
- reframe programs using class and object in python programming (L5)

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

Reference Books:

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

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand computational problem solving and basic elements of python programming.	L2
2. Construct python programming basic constructs like lists, tuple, dictionaries, and sets.	L3
3. Implement string processing and exception handling in programming	L5
4. Analyze string processing and exception handling in programming.	L4
5. Reframe programs using class and object in python programming.	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A535L.1	3	-	3	-	-	-	-	-	-	-	-	3	-	-	-
20A535L.2	3	-	3	3	-	-	-	-	-	-	-	3	-	-	-
20A535L.3	3	-	3	3	-	-	-	-	-	-	-	3	-	-	-
20A535L.4	3	-	3	3	-	-	-	-	-	-	-	3	-	-	-
20A535L.5	3	-	3	3	-	-	-	-	-	-	-	3	-	-	-

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

Title of the Course	Probability and Statistics
Category	BSC
Course Code	20AC41T
Year	II B. Tech.
Semester	II Semester
Branch	CE, ME, CSE, AIDS & AIML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To describe the measures of central tendency.
- To introduce the basic concepts of probability theory.
- To elucidate probability distribution for solving problems in engineering.
- To introduce test of Hypothesis and confidence interval for a population parameter of large samples
- To explain the steps of testing of hypothesis for small samples

Unit 1 Introduction to statistics **10**

Mean - Median and Mode for ungrouped and grouped data.
Correlation - correlation coefficient – Karl Pearson's coefficient - Spearman's rank correlation.

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

- Summarize the basic concepts of data science and its importance in engineering (L2)
- Analyze the data quantitatively or categorically measure of averages variability (L4)
- Adopt Correlation methods and principle of least squares, regression analysis

Unit 2 Probability **10**

Axioms of probability – addition theorem of probability - conditional probability-multiplication theorem of probability (without proof) - Baye's theorem.
Random variables - discrete and continuous - Distribution functions - Mean and Variance.

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

- Define the terms trail, events, sample space, probability and laws of probability (L1)
- Make use of probabilities of events in finite sample space from experiments (L3)
- Apply Baye's theorem to real time problems (L3)
- Explain the notation of random variable, distribution functions and expected value (L2)

Unit 3 Probability distributions **8**

Binomial and Poisson distribution - fitting - normal distribution - their properties.

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

- Apply binomial, passion distributions for real data to compute probabilities, theoretical frequencies (L3)
- Interpret the probabilities of normal distribution and its applications (L2)

Unit 4 Estimation and testing of hypothesis for large samples **10**

Point estimation - Interval estimation of one mean (small and large) - one Proportion (large).
Test of Hypothesis: Types of errors, one and two tailed tests, level of significance, single mean -difference of means - single proportion - difference of proportions (large).

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

- Explain the concepts of estimation, interval estimation and confidence intervals (L2)
- Apply the concepts hypothesis testing for large samples (L3)

Unit 5 Testing of hypothesis for small samples **10**

Student t-distribution test for single mean - two means and paired t-test,
Testing of equality of variances (F-test) - χ^2 test for goodness of fit - χ^2 test for independence of attributes.

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

- Apply the concepts of testing hypothesis for small samples to draw the inferences (L3)
- Apply the concepts of estimation of the goodness of fit (L3)

Prescribed Textbooks:

1. Miller and Freund's, Probability and Statistics for Engineers,7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

Reference Books:

1. S. Ross, a First Course in Probability, Pearson Education India, 2002.
2. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.
3. B.V. Ramana, a text book of Probability and Statistics, McGraw Hill, 2008.
4. T.K.V. Iyengar, B. Krishna Gandhi and others, Probability and Statistics, S. Chand, 2007.

Course Outcomes:

Upon successful completion of this course, the student will be able to	Blooms Level of Learning
1. Calculate and interpret the correlation between two variables.	L3
2. understand the basic concepts of Probability, random variables and apply discrete and continuous probability distributions	L2
3. Employ the concepts of probability distributions in real life applications.	L3
4. design the components of a classical hypothesis test for large samples	L4
5. Apply the knowledge of test of hypothesis for small samples in engineering field.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC41T.1	3	3	-	-	-	-	-	-	-	-	-	3
20AC41T.2	3	3	-	-	-	-	-	-	-	-	-	3
20AC41T.3	2	2	-	-	-	-	-	-	-	-	-	2
20AC41T.4	3	3	-	-	-	-	-	-	-	-	-	3
20AC41T.5	3	3	-	-	-	-	-	-	-	-	-	3

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

Title of the Course	Civil Engineering Drawing
Category	PCC
Course Code	20A141T
Year	II B. Tech.
Semester	II Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
This subject provides the knowledge of building by laws, registration, planning of various types of buildings different sign convention of various Civil Engineering Materials, Doors, windows, tiles of roof, drawing of building plans etc.

Unit 1 Building Bye Laws and Regulations 10
Introduction – Terminology – Objectives of building byelaws- building planning regulations and drawing – Floor area ratio (FAR) – Floor space Index (FSI) - Carpet area – Principles underlying building byelaws – classification of buildings – Open space requirements – built up area limitations – Height of Buildings – Wall thickness – lighting and ventilation requirement.
Learning Outcomes: At the end of the unit, the student will be able to learn
- The basic terms technical involved with buildings. (L2)
- To measure different areas such as the built-up area and the carpet area. (L2)
- The importance of building bye-laws in design and construction of buildings. (L2)

Unit 2 Residential Buildings 10
Minimum standards for various parts of buildings – requirements of different rooms and their grouping – characteristics of various types of residential buildings.
Learning Outcomes: At the end of the unit, the student will be able to
- List the minimum requirements of a residential building. (L2)
- Notice the difference between well designed and ill designed residences. (L2)

Unit 3 Public Buildings 10
Planning of Educational institutions, hospitals, dispensaries, Office buildings, banks, industrial buildings, hotels and motels, buildings for recreation. Contemporary architecture in buildings.
Learning Outcomes: At the end of the unit, the student will be able to
- Learn the requirements of various public buildings and their underlying ideas. (L4)
- Learn the basics of management information systems and Construction project management. (L4)

Unit 4 Sign Conventions of Various Materials, Doors, Windows and Trusses 12
All conventional signs and symbols. English bond & Flemish bond odd & even courses for one, one and half, two brick walls in thickness at the junction of a corner. Panelled Door – glazed door –Half panelled and glazed door, glazed windows – panelled windows – Swing ventilator – Fixed ventilator - Couple roof – Collar roof – Kind Post truss – Queen post truss.
Learning Outcomes: At the end of the unit, the student will be able to
- Learn the significance various signs involved in the building drawing. (L3)
- Draw various components of a building. (L3)

Unit 5 Building Planning and Drawing 12
Bye laws - planning and drawing - Given line diagram with specification to draw, plan, section and elevation-sloped and flat roof buildings

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

- Draw the plan, section and elevation of sloped and flat roof buildings. (L5)

Prescribed Text Books:

1. Building Planning & Drawing, Dr N. Kumaraswamy and A. Kameswara Rao, Charotar Publications, 2019.
2. Planning, Designing and Scheduling- Gurucharan Singh and Jagadish Singh, Standard Publishers, 2020.
3. Planning and Designing of Buildings – Y.S.Sane, 1964.
4. National Building Code 2016.

Reference Books:

1. PERT and CPM – Project planning and control with by Dr.B.C.Punmia & Khandelwal – Laxmi publications.
2. Building by laws bye state and Central Governments and Municipal corporations.
3. 'A' Series & 'B' Series of JNTU Engineering College, Anantapur.
4. Building drawing – M.G.Shah, C.M.Kale, S.Y.Patki
5. Architectural Planning and Design of Buildings, Pawar and Limaya, 2016, Nirali Prakashan.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Apply various technical terms in related to building construction in drawings.	L2
2. Understand the basic building By-laws of residential and public buildings..	L2
3. Prepare drawings following the by-laws..	L4
4. Associate a material with a specific sign in the drawing.	L3
5. Visualize and create varieties of building plans for both residential and public building.	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A141T.1	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1
20A141T.2	1	-	1	-	-	1	-	-	-	-	-	-	1	-	1
20A141T.3		-	1	-	-	1	1	1	-	-	-	-	-	-	1
20A141T.4	1	-	1	-	1	-	-	-	-	-	1	1	-	-	1
20A141T.5	1	-	1	1	1	-	1	-	1	-	-	-	-	1	1

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

Title of the Course	Materials, Testing and Evaluation
Category	PCC
Course Code	20A142T
Year	III B. Tech.
Semester	II Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
This course aims at
- Understanding different types of construction materials available along with its application.
- Exposure to different types of building components.
- Explains the functional role of concrete and testing.
- Explains different types of concrete.

Unit 1 Bricks, Stones, Wood and Tiles. 9

Stones And Bricks: Specifications- cement bricks - Properties of building stones – relation to their structural requirements. Classification of stones – Stone quarrying – precautions in blasting, Dressing of stone, Composition of good brick earth, various methods of manufacture of bricks. Comparison between clam burning and kiln burning.

Tiles: Characteristics of good tile – manufacturing methods, Types of tiles.

Wood: Structure – properties – Seasoning of timber. Classification of various types of woods used in buildings – Defects in timber

Learning Outcomes The course will provide knowledge on
- Differences and uses of bricks and stones. (L1)
- Tiles and their Manufacturing. (L1)
- Types of wood, seasoning and defects(L1)

Unit 2 Building Components 10

Masonary: Types of masonry, English and Flemish bonds, Rubble and Ashlar masonry, cavity and partition walls.

Foundations: Shallow foundations – Spread, combined strap and mat footings.

Building Components: Lintels, Arches, stair cases – Types. Different types of floors-Concrete, Mosaic, Terrazo floors, Pitched, flat and curved Roofs. Lean-to-Roof, Coupled Roofs, Trussed roofs- King and Queen Post Trusses. RCC Roofs.

Finishings: Damp proofing- materials used. Plastering, pointing, white washing and distempering – Painting – Constituents of a paint – Types of paints – Painting of new/old Wood – Varnish – Form work and scaffolding.

Learning Outcomes
- Understand types of masonry and foundations. (L2)
- Impart knowledge on different building components like lintels, arches, staircases, floors and roofs. (L2)

Unit 3 Concrete 8

Ingredients of concrete: Manufacturing of cement Chemical composition –Bogues compounds, Test`s on properties of cement, aggregates, water –IS specifications, Admixtures – classification, properties limitations.

Fresh and Hardened concrete: Mixing, curing, workability (Slump, Compaction factor, Vee bee-Test. Abram's law, gel space ratio, Destructive and Non-Destructive testing of concrete.

Learning Outcomes
- Understand different ingredients of concrete and its specification. (L1)
- Able to know testing of fresh and hardened concrete. (L1)

Unit 4 Hardened Concrete 12

Elasticity, creep & shrinkage – Modulus of elasticity –Dynamic modulus of elasticity Posisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

Mix design : Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods –IS 10262:2019 and ACI method.

Learning Outcomes

- Understand creep, shrinkage and elastic behavior of concrete. (L3)
- Design the mix design of concrete by various methods. (L3)

Unit 5 Special Concretes 8

Light weight aggregates – Lightweight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C – Applications – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete – Applications – High performance concrete – Self consolidating concrete– Bacterial concrete.

Learning Outcomes

- Imparts knowledge on different types of concrete. (L2)
- Understands the application of particular type of concrete. (L2)

Prescribed Text Books:

1. Properties of Concrete by A.M.Neville – Pearson publication – 4th edition
2. Concrete Technology by M.S.Shetty. – S.Chand & Co.
3. Building material by S K Duggal – New Age International Publishers; Second Edition.
4. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.

Reference Books:

1. Kyriakos Komvopoulos (2011), Mechanical Testing of Engineering Materials, Cognella.
2. E.N. Dowling (1993), Mechanical Behaviour of Materials,Prentice Hall International Edition.
3. Building materials by R.S.Rangwala,Charotar publications.

Course Outcomes:

At the end of the course the student	Blooms Level of Learning
1. Understand the characteristics of different stones, bricks, tiles wood and other building materials.	L1
2. Apply the knowledge on masonry, foundations and other building components-appropriately in the field.	L2
3. Understand the concrete making material and characteristics of fresh and hardened concrete.	L1
4. Design mix for different grades of concrete and understand durability properties of concrete.	L3
5. Demonstrate his knowledge on special concretes.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A142T.1	-	-	-	-	-	1	-	-	-	-	-	-	2	-	2
20A142T.2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2
20A142T.3	-	-	-	-	-	1	-	-	-	1	-	-	-	2	2
20A142T.4	-	3	-	-	-	1	-	-	-	1	-	-	-	-	2
20A142T.5	-	-	-	-	-	1	-	-	-	1	-	-	1	-	2

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

Title of the Course	Engineering Geology
Category	PCC
Course Code	20A143T
Year	II B. Tech.
Semester	II Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- The objective of this is to give the basic knowledge of Geology that is required for construction of various Civil Engineering Structures. The syllabus includes the basics of Geology. Geological hazards and gives a suitable picture on the Geological aspects that are to be considered for the planning and construction of major Civil Engineering projects.

Unit 1 Geology and Civil Engineering 10

Importance of geology from civil engineering point of view – Brief study of case histories of failure of some civil engineering constructions due to geological draw backs – Importance of physical geology, petrology and structural geology; weathering: Effects of weathering of rocks – Importance of weathering with reference to dams, reservoirs and tunnels.

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

- The importance of geology in civil engineering perspective. (L4)

Unit 2 Mineralogy 10

Definition of mineral – Importance of study of minerals – Different methods of study of minerals– Advantages of study of minerals by physical properties - Identification of minerals – Physical properties of common rock forming minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite – Study of other common economic minerals such as Pyrite, Hematite, Magnetite,Galena, Pyrolusite, Graphite, Magnesite and Bauxite.

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

- Understand the fundamental difference between a rock and a mineral. (L3)
- Determine how the mineral composition changes the physical properties. (L3)

Unit 3 Petrology 10

Definition of rock – Geological classification of rocks into igneous, sedimentary and metamorphic rocks –Dykes and sills - Common structures, textures – Features of igneous, sedimentary and metamorphic rocks – Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

Structural Geology: Out crop - Strike and dip – Classification and recognition of folds, faults, unconformities, and joints – Their importance in-situ – Foliation and lineation – Concept of stress and strain, analysis of stress and response of rock to stress – Analysis of deformation and strain ellipsoid – Common types of soils, their origin and occurrence in India.

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

- Classify rocks on different bases. (L4)
- Understand the basics of structural geology. (L4)

Unit 4 Groundwater, Earthquake And Landslides 8

Groundwater – Water table – Common types of groundwater – Springs – Cone of depression – Geological controls of groundwater movement – Groundwater exploration – Hydrological properties of rocks: porosity, permeability, storativity, specific yield and specific retention Earthquakes, their causes and effects - shield areas and seismic zones – Seismic waves - Richter scale - Precautions to be taken for building construction in seismic areas – Landslides, their causes and effect - Measures to be taken to prevent their occurrence.

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

- Understand how the groundwater id affected by the geological formations. (L4)
- Learn methods available to damage form earthquakes and landslides. (L4)

Unit 5 Geology Of Dams And Reservoirs 12

Types of dams – Geological considerations in the selection of a dam site – Analysis of dam failures of the past – Factors contributing to the success of a reservoir.

Tunnels: Purposes of tunneling – Effects of tunneling on the ground – Geological considerations (i.e., Tithological, structural and groundwater) in tunneling, over break and lining in tunnels.

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

- Learn and understand requirements of planning dams and tunnels. (L3)

Prescribed Text Books:

1. N. Chennkesavulu, Engineering Geology,2nd Edition, Mc-Millan India Ltd., New Delhi, 2011.
2. D. Venkata Reddy, Engineering Geology, 1stEdition, Vikas Publications, New Delhi, 2010.

Reference Books:

1. K.V.G.K. Gokhale, Principles of Engineering Geology,1st Edition, B.S. Publications, Hyderabad, 2005.
2. Parbin Singh, A Text Book of Engineering and General Geology, 8th Edition, S.K. Kataria and Sons, New Delhi, 2010.
3. Krynine and Judd, Principles of Engineering Geology and Geotechnics, 1st Edition, CBS Publishers and Distributors, 2005.
4. Mukarjee, Engineering Geology, 11th Edition, World Press Pvt. Ltd., Calcutta, 2010.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Apply the practical knowledge of principles of Engineering Geology	L4
2. Identify properties of soils, various rocks and minerals.	L3
3. Analyze the suitability of sites for various civil engineering structures.	L4
4. Remembering about Geological controls of groundwater movement.	L4
5. Remembering about site selection of dam and past dam failuresstructural.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A143T.1	3	3	-	-	3	-	-	3	2	-	2	-	-	-	-
20A143T.2	3	3	3	2	-	-	-	2	3	-	-	-	-	-	-
20A143T.3	2	2	-	3	-	-	-	3	2	-	-	-	-	-	-
20A143T.4	-	-	3	-	3	-	-	2	2	2	3	-	-	-	-
20A143T.5	-	-	2	2	2	-	-	3	2	3	2	2	-	-	-

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

Title of the Course	Structural Analysis
Category	PCC
Course Code	20A144T
Year	II B. Tech.
Semester	II Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To make the students to understand different types of types of structures analysis methods and also to draw shear forces diagram, bending moment diagram & ILD's for different beams.

Unit 1 Fixed Beams **10**

Introduction to statically indeterminate beams with U.D.L, central point load and eccentric point load. Number of point loads and uniformly varying loads shear force and bending moment diagrams-Deflection of fixed beams effect of sinking of support- propped cantilever.

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

- To check if a beam is statistically determinate or indeterminate. (L4)
- To draw the shear force & bending moment diagram of fixed beams (L3)
- Determine the deflections of indeterminate structures. (L4)

Unit 2 Continuous Beams **10**

Introduction-Clapeyron's theorem of three moments-Analysis of continuous beams with constant moment of inertia with one or both ends fixed-continuous beams with overhang, continuous beams with different moment of inertia for different spans-Effects of sinking of Supports-shear force and Bending moment diagrams.

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

- Analyze the beams with different moments of inertia for the bending moment diagrams and shear forces diagrams. (L3)
- Determine the effects of sinking of supports on bending moment diagrams and shear force diagrams. (L4)

Unit 3 Slope-Deflection Method **10**

Introduction, Derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

Moment Distribution Method: Introduction, application to continuous beams with and without sinking of supports.

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

- Draw the bending moment diagrams and shear force diagrams of given beams by using slope deflection equations. (L4)
- Draw the bending moment diagrams and shear force diagrams of given beams by using Moment distribution method. (L4)

Unit 4 Influence Lines and Moving Loads **8**

Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a section single point load, U.D.L longer than the span, U.D.L shorter than the span.

Moving Loads: Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single Concentrated load U.D.L longer than the span, U.D.L shorter than the span, two point loads with fixed distance between them and several point loads.

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

- Draw the influence lines for different loading conditions & moving loads. (L4)
- Determine the absolute maximum Shear force and bending moment's absolute maximum from moving loads. (L4)

Unit 5 Indeterminate Structural Analysis 12

Indeterminate Structural Analysis –Determination of static and kinematic indeterminacies–Solution of trusses with up to two degrees of internal and external indeterminacies– Castigliano's theorem.
Single bay and single storyed frames.

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

- Use Castigliano's theorem to determine deflections. (L3)
- Perform analysis of frames. (L3)

Prescribed Text Books:

1. Analysis of Structures-VolI& Vol IIbyV.N.Vazirani& M.M.Ratwani, Khanna Publications, New Delhi.
2. Structural Analysis by V.D.PrasadGalgotiapublications,2nd Editions.
3. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi
4. ComprehensiveStructuralAnalysis-Vol.I&2by Dr. R. Vaidyanathan & Dr.P.Perumal- Laxmi publications pvt.Ltd., New Delhi
5. Basic structural Analysis by C.S.Reddy, Tata Mcgrawhill, New Delhi.

Reference Books:

1. Mechanics of Structures by S.B.Junnarkar, Charotar Publishing House, Anand, Gujrat
2. Theory of Structures by Gupta, Pandit& Gupta; Tat Mc.Graw– Hill Publishing Co. Ltd., New Delhi.
3. Theory of Structures by R.S. Khurmi, S. Chand Publishers
4. Strength of Materials and Mechanics of Structures- by B.C.Punmia, Khanna Publications, NewDelhi.
5. Introduction to structural analysis by B.D. Nautiyal, New age international publishers, NewDelhi.

Course Outcomes:

At the end of the course,	Blooms Level of Learning
1. The students determine the fixed end moments in fixed beams and also draw the shear force and bending moment diagrams.	L4
2. The students can determine the end moments in Continuous beams and also draw the shear force and bending moment diagrams.	L3
3. The student have knowledge on various methods like Slope Deflection & Moment Distribution method.	L4
4. The students can perform Influence Line analysis of determinate beams and also able to apply knowledge on Moving loads.	L4
5. The students can find determinate, indeterminate structures and trusses.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A144T.1	3	3	-	-	3	-	-	-	-	-	-	-	-	-	-
20A144T.2	3	3	2		3	-	-	-	-	-	-	3	-	-	-
20A144T.3	3	3	2	2	3	-	-	-	-	-	-	-	-	-	-
20A144T.4	3	3	2	2	3	-	-	-	-	-	-	1	-	-	-
20A144T.5	3	3	2	1	3	-	-	-	-	-	-	-	-	-	-

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

Title of the Course	Engineering Geology Lab
Category	PCC
Course Code	20A143L
Year	II B. Tech.
Semester	II Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- The objective of the course is to make the student to understand the fluid flow concepts and get familiarity with flow measuring devices.

List of Experiments **40**

1. Study of physical properties and identification of rock forming minerals.
2. Study of physical properties and identification of ore forming minerals.
3. Megascopic identification of common igneous rocks.
4. Megascopic identification of common sedimentary rocks.
5. Megascopic identification of common metamorphic rocks.
6. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
7. Simple structural geology problems.

Course Outcomes:

At the end of the course, the student able to :	Blooms Level of Learning
1. Understand physical properties and identity minerals referred under theory. Identify the various rocks, minerals depending on geological classifications.	L2,L3
2. Classify varies rocks and understand their properties.	L2
3. Study of rocks and their identification.	L3
4. Identity and draw sections for geological maps showing tilted beds, faults, uniformities.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A143L.1	-	2	-	1	2	-	2	2	-	-	-	2	-	-	-
20A143L.2	2	-	-	2	1	-	-	2	1	-	-	2	-	-	-
20A143L.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20A143L.4	2	2	-	-	-	-	-	3	-	2	-	-	-	-	-

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

Title of the Course	Material Testing Lab
Category	PCC (Laboratory)
Course Code	20A145L
Year	II B. Tech.
Semester	II Semester
Branch	Civil Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- The objective of the course is to make the student to understand the fluid flow concepts and get familiarity with flow measuring devices.

List of Experiments **40**

1. Normal Consistency of cement.
2. Fineness of cement.
3. Initial setting time and final setting time of cement.
4. Specific gravity of cement.
5. Soundness of cement.
6. Compressive strength of cement.
7. Water absorption of bricks.
8. Workability test on concrete by compaction factor, slump and Vee-bee.
9. Mix design: Concrete.
10. Evaluation of mechanical properties of concrete.
11. Young's modulus concrete.
12. Bulking of sand.
13. Non-Destructive testing on concrete (for demonstration).
14. Flexural strength of concrete.
15. Water permeability test on concrete.

Course Outcomes:

At the end of the course, the student are able to	Blooms Level of Learning
1. Evaluate the Mechanical properties of concrete.	L5
2. Determine Normal Consistency of cement.	L2
3. Determine the Bulking of sand.	L3
4. Test the basic properties of concrete, fresh and hardened concrete.	L3
5. Demonstrate the properties of hardened concrete by Non-Destructive Tests.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A145L.1	3	3	-	-	3	-	-	-	-	2	-	-	-	-	-
20A145L.2	3	3	2	-	3	-	-	1	-	2	-	2	-	-	-
20A145L.3	1	2	-	3	-	3	-	-	-	-	-	2	2	-	-
20A145L.4	2	3	1	-	1	-	2	-	2	-	2	1	1	1	-
20A145L.5	2	2	2	-	-	1	-	1	-	-	2	-	-	3	-

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

Title of the Course Hydraulics Engineering Lab
Category PCC
Course Code 20A146L

Year II B. Tech.
Semester II Semester
Branch CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- The objective of the course is to make the student to understand the fluid flow concepts and get familiar with Hydraulic devices such as turbines and pumps.

List of Experiments 40

1. Impact of jet on vanes.
2. Study of hydraulic jump.
3. Efficiency test on single-stage Centrifugal pump.
4. Efficiency test on Multi-stage Centrifugal pump
5. Efficiency test on Reciprocating pump.
6. Performance test on Pelton wheel turbine.
7. Performance test on Francis turbine.
8. Performance test on Kaplan turbine.
9. Specific speed of Pelton wheel turbine

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand hydraulic jump and impact of jet on vanes	L2
2. Understand about the proper pump or turbine to optimize the efficiency	L2
3. Evaluate the Efficiency on single-stage and multi-stage centrifugal pump	L5
4. Evaluate Specific speed of Pelton wheel , Francis and Kaplan turbines	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A146L.1	3	3	-	-	3	-	-	1	-	2	-	3	-	-	-
20A146L.2	3	3	2	-	3	-	-	-	-	-	-	-	-	-	-
20A146L.3	2	2	2	-	-	1	-	1	-	-	2	-	-	3	-
20A146L.4	2	2	2	-	-	1	-	1	-	-	2	-	-	3	-

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

Title of the Course Computer Aided Building Drawing Lab
Category SC
Course Code 20A147L

Year II B. Tech.
Semester II Semester
Branch CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives:
- To enable students to gain proficiency in computer aided drawing and make them industry ready.

List of Experiments **40**
1. Introduction to Auto CAD
2. Practice exercise on Auto Cad software
3. Practice exercise on geometric models.
4. Development of plan/drawing by Block editing & drafting settings.
5. Drawing plan of a building in auto cad
6. Drawing plan of a multi storied building in auto cad.
7. Drawing Section and elevation of a single storied building in auto cad.
8. Drawing Section & elevation of a multistoried building
9. Detailing of building components like doors, windows, roof trusses.
10. Practice exercise on 3-D modeling of a building.
11. Practice exercise on 3-d modeling of types of stair cases.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Draw Section and elevation of a single storied building in auto cad tool,	L2
2. Draw plan of a building in Auto CAD tool.	L2
3. Develop 3-D models for building using Auto CAD	L2
4. Develop 3-D modeling for stair cases using Auto CAD	L2
5. Detail building components like doors, windows, roof trusses using Auto CAD.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A147L.1	3	3	2	-	3	-	3	-	3	-	3	3	-	-	-
20A147L.2	3	3	2	-	3	-	3	-	3	-	3	3	-	-	-
20A147L.3	3	3	2	-	3	-	3	-	3	-	3	3	-	-	-
20A147L.4	3	3	2	-	3	-	3	-	3	-	3	3	-	-	-
20A147L.5	3	3	2	-	3	-	3	-	3	-	3	3	-	-	-

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

Title of the Course	Basic Reinforced Concrete Design
Category	PCC
Course Code	20A151T
Year	III B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- As structural elements are subjected to different loading so to with stand the structures, for external loading we need to design the structures for its safety
- To impart comprehensive knowledge on the design of slabs
- To impart comprehensive knowledge on the design of beams
- To impart comprehensive knowledge on the design of beams for Shear, Torsion & Bond
- As structural elements are subjected to different loading we need to design the structures for its serviceability

Unit 1 Introduction To Design Philosophy 12

Introduction to Materials, Constituents of concrete, recommendation in IS 456 – 2000, grades of concrete, Design philosophy- working stress method, design constants; singly reinforced beam. Concept of limit state design – Comparison between two methods- Basic statistical principles – Characteristic loads– Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design – stress - block parameters – limiting moment of Resistance

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

- Understand the behavior of the materials(L2)
- Understand the working stress design philosophy(L4)
- Understand the limit state design philosophy(L2)

Unit 2 Limit State Design of Shear, Torsion and Bond 14

Limit state design of section for shear, torsion and bond, I.S. code provisions. Design examples in simply supported beam including detailing

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

- Understand the design parameters of shear (L2)
- Understand the design parameters of shear (L3)
- Understand the design parameters of shear (L2)

Unit 3 Limit State Design of Beams & Slabs 10

Limit state design of singly reinforced, doubly reinforced beams and T and L beam sections.
Design of one way slab - Two-way slab, continuous slab (No Analytical questions) Using I S Coefficients.

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

- Design the singly beams, Doubly ,Tee & Lee beams (L4)
- Understand the design parameters of designing of slabs(L5)
- Design the one way &two way slab. (L5)

Unit 4 Limit State Design of Columns 11

Short columns–under axial loads, Uni-axial bending and biaxial bending – I S Code provisions. Introduction of long columns.

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

- Understand the design parameters of designing of columns(L4)
- Design the uniaxial columns(L2)
- Design the Biaxial columns(L4)

Unit 5 Limit State Design of Footings & Serviceability 15

Different types of footings – Design of isolated – square and rectangular footings.
Limit state design of serviceability for deflection, cracking and codal provision.

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

- Understand the design parameters of designing of footings(L4)
- Design the different types of footings (L2)
- Design the beams & slab according to Limit state design of serviceability (L4).

NOTE: All the designs to be taught in Limit State Method
Following plates should be prepared by the students.

1. Reinforcement particulars of T-beams and L-beams.
2. Reinforcement detailing of continuous beams.
3. Reinforcement particulars of columns and footings.
4. Detailing of One way, two way and continuous slabs

Prescribed Text Books:

1. Reinforced Concrete (Volume - 1) (English, Undefined, Shah H.j.)
2. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
3. Varghese .P.C, “Limit State Design Of Reinforced Concrete”, 2Nd Ed, PHI Learning Pvt. Ltd., 2004

Reference Books:

1. Gambhir .M.L, “Design of Reinforced Concrete Structures”, Prentice Hall of India, Pvt. Ltd., New Delhi, 2008
2. “Code of Practice for Plain and Reinforced Concrete”, BIS, New Delhi, IS456-2000.
3. “Recommended guidelines for Concrete Mix Design”, BIS, New Delhi, IS 10262 1982
4. “Design Aids for Reinforced Concrete to IS 456”, Special Publication (SP16), BIS New Delhi,1980
5. “Code of Practice for Structural use of Unreinforced Masonry,” BIS, New Delhi, IS1905-1987.
6. Relevant IS codes such as IS 456 – 2000,IS 3370(Part-IV), BIS 2000,SP-16
7. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the basic concepts of reinforced concrete analysis and design	L2 & L4
2. Understand the behavior and various modes of failure of reinforced concrete members	L2
3. Analyze and design various reinforced concrete members like beams & slabs	L4 & L6
4. Understand and analyze behavior of columns and their support conditions , Design and do detailing of reinforcement for the columns	L2 & L4
5. Understand and analyze the various types of footing , design and do detailing of reinforcement	L2 & L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A151T 1	3	-	-	3	1	-	2	1	-	-	2	3	3	-	-
20A151T 2	3	1	3	-	2	-	-	-	-	-	-	1	3	1	3
20A151T 3	-	3	3	-	-	-	2	-	-	-	-	2	-	3	3
20A151T 4	2	1	2	-	-	3	-	-	-	-	-	-	2	1	2
20A151T 5	1	3	2	-	1	-	-	-	-	-	-	3	1	3	2

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

Title of the Course	Environmental Engineering
Category	PCC
Course Code	20A152T
Year	III B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To provide the knowledge of sources and collection, conveyance and distribution of waste water and its treatment.
- To convey the concepts of sewage and its collection, characteristics and treatment.

Unit 1 Sources and Demand of Water 10

Introduction: Importance–Need–Objective– Flow diagram of water supply systems.

Sources and Demand of Water: Different sources of water– Quantity and quality of different sources – Types and variation in water demand – Factors affecting water demand – Design period –Forecasting of population, different methods and their suitability.

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

- Different sources of water, the quality and quantity available in them (L2)
- Methods of population forecast and various factors affecting their suitability (L2)

Unit 2 Water Collection, Conveyance and Distribution 10

Intake works for collection of surface water – Conveyance of water – Gravity and pumping methods – Systems of distribution –Distribution reservoirs – Distribution networks;

Quality Requirements of Water: Sources of water pollution – Water borne diseases – Physical, chemical and biological impurities – Tests conducted for determining impurities – Water standards for different uses - Water quality standards WHO.

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

- Basics of water conveyance to the public and the design of distribution networks.(L3)
- The quality requirements of water used for different purposes.(L2)

Unit 3 Water Treatment 10

Conventional water treatment processes units and their functions - Theory and design of aeration, coagulation, flocculation, and clarification - Determination of optimum dose of alum for coagulation of water. Theory of filtration – Different types of filters and their design - Disinfection – Mechanism of disinfection – Different methods of disinfection – Break point chlorination – Types chlorination.

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

- Learn and Design various treatments for safe drinking water supply.(L4)
- Differentiate between disinfection and chlorination. (L4)

Unit 4 Sewage 12

Fundamental Definitions- system of sewerage- classification of sewers-Factors affecting the quantity of sewage, Determination of sewage, flow variation of sewage, Factors affecting the storm water, Determination of rainfall intensity, determination of run-off coefficient, computation of storm water, Design of sewers, Shapes of sewer, sewer materials, sewer appurtenance

Decomposition, Physical and chemical characteristics of Sewage-Determination of solids, Dissolved oxygen-Oxygen and chemical oxygen demand- Biochemical oxygen demand - Chlorine demand - Carbonaceous demand - Nitrogenous demand..

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

- Physical-chemical properties of wastewater.(L4)
- Define of sewage and the factors affecting the quantity and quality of wastewater.(L4)
- Learn the application of various sewer appurtenances. (L4)

Unit 5 Sewage Treatment 12

Preliminary treatment methods- screening, grit chambers, skimming tank-Primary treatment methods- theory of sedimentation; sedimentation tank-Secondary treatment methods- Trickling Filters, aeration tank, Activated sludge process, oxidation pond, septic tank, Imhoff tank, sludge digestion tank-Tertiary treatment methods- general description

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

- Design of treatment units for domestic wastewater.(L3)
- Various energy efficient wastewater treatment methods.(L3)

Prescribed Text Books:

1. G.S. Birdie and J. S. Birdie, Water Supply and Sanitary Engineering, 8th Edition, Dhanpat Rai and Sons Publishers, New Delhi, 2010.
2. S.K. Garg, Environmental Engineering (Vol. I and Vol. II): Water Supply Engineering, 34th Revised Edition, Khanna Publishers, New Delhi, 2019.

Reference Books:

1. Waste water Engineering, Metcalf and Eddy, 2017, McGraw Hill International.
2. K.N. Duggal, Elements of Environmental Engineering, 1st Edition, S.Chand Publishers, New Delhi, 2010.
3. Nazih K. Shammas and Lawrence K. Wang, Fair, Geyer and Okun's Water and Waste Water Engineering: Water Supply and Wastewater Removal, 3rd Edition, John Wiley and Sons, New Delhi, 2011.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand forecasting population by different methods.	L2
2. Understand the sources, collection, conveyance and distribution of water.	L2
3. Understand and apply the methods of water treatment	L3
4. Estimate the quantity of sewage, storm water and Design the sewers.	L4
5. Analyze sewage characterizes and treatment methods.	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A152T.1	2	2	-	-	-	2	-	-	-	-	-	-	-	-	-
20A152T.2	2	-	-	-	-	2	-	-	-	-	-	3	-	-	-
20A152T.3	2	-	-	-	-	-	-	-	-	-	-	2	-	-	-
20A152T.4	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-
20A152T.5	2	2	2	-	-	2	-	-	-	-	-	-	-	-	-

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

Title of the Course	Water Resource Engineering
Category	PCC
Course Code	20A153T
Year	III B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To study the theory of hydrology and its components
- To impart knowledge on hydrograph analysis and ground water concept
- To study irrigation concept, canals and dams
- To learn design aspects of gravity dams, earth dams, spillways
- To learn design aspects of canal falls, regulators and cross drainage works

Unit 1 Introduction to Hydrology 10

Precipitation: Hydrology and its applications, hydrologic cycle, types and forms of precipitation, types of rain gauges, Computation of average rainfall over a basin, missing rainfall data, processing of rainfall data - mass curve, hyetograph, moving average curves, intensity duration curves, intensity duration frequency curves, depth area duration curves, double mass curve.

Evaporation & Infiltration**:** Factors affecting evaporation, measurement of evaporation, factors affecting infiltration, measurement of infiltration, infiltration indices.

Learning Outcomes: After the completion of course, the student will be able to

- Understand movement of water through the earth. (L1)
- Measurement of precipitation, evaporation, and infiltration across a given catchment area (L2)

Unit 2 Hydrographs and Groundwater 10

Hydrograph Analysis: Unit Hydrograph, uses, limitations, application, derivation, S-curve Hydrograph, Synthetic UH, Flood estimation by Rational method and Gumbel's method.

Groundwater: Introduction, types of aquifers, aquifer parameters, Darcy's law, Steady flow into wells for confined and unconfined aquifers, sea water intrusion.

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

- Read and analyse different types of hydrographs. (L2)
- Estimate floods. (L3)

Unit 3 Irrigation 10

Irrigation: Necessity and importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, Indian agricultural soils, standards of quality for Irrigation water, consumptive use, estimation of consumptive use, duty and delta, factors affecting duty, irrigation requirements of crops, irrigation efficiencies.

Canals & Dams: Classification of canals, Design of irrigation canals by Kennedy's and Lacey's theories. Types of dams, merits and demerits, factors affecting selection of type of dam, types of reservoirs, selection of site for reservoir, reservoir yield, estimation of capacity of reservoir using mass curve

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

- Understand the importance of irrigation, different types and methods of irrigation. (L2)
- Design different types of canals. (L3)

Unit 4 Dams and Spillways 8

Gravity Dams, Earth Dams & Spillways: Forces acting on a gravity dam, causes of failures of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of gravity dam, stability analysis, types of earth dams, causes of failures of earth dam, criteria for safe design of earth dam, measures for control of seepage, seepage through earth dam-graphical method.

Spillway Gates & Seepage Theories**:** Types of spillways, design principles of Ogee spillways, types of spillway gates, Causes and failures of hydraulic structures on permeable foundations, Bligh's creep theory, Khosla's theory

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

- Discern between different types of dams and their limiting conditions. (L2)
- Understand the problems of creep and seepage and the functions of spill ways. (L3)

Unit 5 Diversion Head works, falls and Regulators. 12

Diversion Head Works & Canal Falls: Types of head works, layout of diversion head works, components of diversion head works, Types of falls, design principles of Sarda type fall, trapezoidal notch fall and straight glacis fall

Canal Regulators, Canal Outlets & Cross Drainage Works: Canal regulation works, principles of design of distributor and head regulators, types of canal outlets, Types of Cross Drainage works, selection of site, design principles of aqueduct, siphon aqueduct and super passage.

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

- Design different types of falls and diversion head works. (L3)
- Understand and design of different types of regulators and outlets. (L3)

Prescribed Text Books:

1. Engineering Hydrology by K.Subramanya, The Tata Mcgraw Hill Company, New Delhi
2. Engineering Hydrology by P.Jayarami Reddy, Laxmi publications pvt. Ltd., New Delhi
3. Irrigation and water power engineering by Punmia & Lal, Laxmi publications pvt. Ltd., New Delhi

Reference Books:

1. Water resources engineering (Vol I) by S.K Garg, Khanna publishers.
2. Irrigation engineering and hydraulic structures (Vol II) by S.K Garg, Khanna publishers.
3. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of learning
1. Analyze the hydro-meteorological data.	L2
2. Understand the hydrograph theory in the analysis of runoff and determination of design discharge for hydrological projects.	L2
3. Understand and apply various water recharging techniques.	L2,L3
4. Compare the Design gravity dams, earth dams, spillways.	L3
5. Design canal falls, regulators and cross drainage works.	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A153T.1	1	2	2	-	-	2	-	-	-	-	-	-	-	-	-
20A153T.2	1	1	1	-	-	2	-	-	-	-	-	-	-	-	-
20A153T.3	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
20A153T.4	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
20A153T.5	-	1	-	-	-	2	-	-	-	-	-	-	-	-	-

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

Title of the Course	Literature and Life
Category	OEC
Course Code	20AC5AT

Year	III B. Tech
Semester	I Semester
Branch	CE, EEE, ME & ECE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	0

Course Objectives:

- Identify specific features of major literary genres.
- Critically analyze the voices adopted by authors to convey their views on life.
- Develop a style of reading and writing aligned with one's personality type.
- To construct a philosophy of life as a foundation for one's growth.

Unit 1 Prose **8**

- Abdul Kalam, "When I Failed"
- Chetan Bhagat, "My Stupid Suicide Plan"
- R.K. Narayan, "Toasted English"

Learning Outcomes: The first module examines the hiatus between aspiration and achievement in the essays of Kalam and Bhagat, the humorous and satirical presentation of common problems in the essays of Narayan. (L3)

Unit 2 Poetry **8**

- W. Shakespeare, "Let me not to the marriage of true minds"
- W.H. Davies, "Leisure"
- Robert Frost, 'The Road Not Taken'

Learning Outcomes: The second module discusses the hope and faith necessary for life in the poems of Shakespeare, Davies, and Frost. (L2)

Unit 3 Drama **12**

- Girish Karnad's Tughlaq

Learning Outcomes: The third module analyses the competitive, cunning, and commercial as well as political life in the play by Karnad. (L4)

Unit 4 Drama **12**

- Girish Karnad's Tughlaq (Contd...)

Learning Outcomes: The fourth module analyses the competitive, cunning, and commercial as well as political life in the play by Karnad. (L4)

Unit 5 Short Story **8**

- G G Joshi, "The Letter"
- Katherine Mansfield, "A Cup of Tea"
- J G Rosa, "The Third Bank of the River"
- Anjana Appachana, "Sharmaji"

Learning Outcomes: The fifth module considers the delicate and fragile human feelings of a father, parents, a commoner, a son, a professional, and an employee in the stories of Joshi, Mansfield, Rosa, and Appachana. (L3)

SupplementaryAcademicResources:*(Includestextbooks,journal articlesande-learningmaterials)*

1. Barnet,S.,Burto,W.,andCainW.E.2008.*AnIntroductionto Literature*.New York:Pearson Longman.
2. Bennett,A.,andRoyle,N.2015.*ThisThingCalled Literature:Reading,Thinking,Writing*.London: Routledge
3. Kusch,C. 2016.*LiteraryAnalysis:TheBasics*.London:Routledge.
4. Watson, L.E.Ed.1951.*LightfromManyLamps*.New York: Simon and Schuster.

Course Outcomes:

Upon the successful completion of the course, the student will be able to	Blooms Level of Learning
1. appreciate the close relationship between literature and life	L3
2. protect themselves against their own self-destructive thoughts	L4
3. establish better relationships with their close and distant relatives	L3
4. analyze the arbitrary nature of social and political structures	L3
5. face the challenges of family and business organizations	L4

CO-PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC5AT.1	-	-	-	-	-	-	-	3	-	-	-	3
20AC5AT.2	-	-	-	-	-	-	-	3	-	-	-	3
20AC5AT.3	-	-	-	-	-	-	-	3	-	-	-	3
20AC5AT.4	-	-	-	-	-	-	-	3	-	-	-	3
20AC5AT.5	-	-	-	-	-	-	-	3	-	-	-	3

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

Title of the Course Linear Algebra and Numerical Analysis
Category OEC
Course Code: 20AC5BT

Year III B. Tech
Semester I Semester
Branch CE, EEE, ME & ECE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	0

Course Objectives:
- To introduce the concept of vector space.
- To introduce the concept of linear transformation.
- To learn how to apply numerical methods to solve the equations

Unit 1 Vector Space **8**

Vector spaces, Subspaces, Linear independence, Basis and dimension, Ordered basis and coordinates.

Learning Outcomes: At the end of the unit, the student will be able to:
- Define Vector space and Subspaces (L1)
- Understand the concept of basis and dimension(L2)

Unit 2 Linear transformations and Inner product spaces **12**

Linear transformations, Rank-nullity theorem (without proof), Algebra of linear transformations, Isomorphism, Matrix representation, Change of basis.

Inner products, Norms on Vector spaces, orthogonal and orthonormal sets, Gram-Schmidt process

Learning Outcomes: At the end of the unit, the student will be able to:
- Define linear transformation (L1)
- Understand the concept of rank and nullity (L2)

Unit 3 Solution of simultaneous algebraic equations **10**

Iterative methods of solutions-Gauss Jacobi's method, Gauss-Seidal method, Relaxation method. Solution of non-linear simultaneous equations-Newton-Raphson method.

Learning Outcomes: At the end of the unit, the student will be able to:
- Use iteration methods to solve system of linear equations (L3)
- Apply Newton-Raphson method to solve non-linear simultaneous equations (L3)

Unit IV Numerical solution of Partial differential Equations **10**

Introduction-Classification of second order equations, finite difference approximation to partial derivatives, Elliptic equation, solution of Laplace equation, solution of Poisson's equation.

Learning Outcomes: At the end of the unit, the student will be able to:
- Understand the concept of finite difference approximation (L2)
- Utilize the numerical methods to solve partial differential equations (L3)

Unit V Numerical solution of heat and wave Equations **8**

Parabolic equation, Solutions of one-dimensional heat equation (Explicit & Implicit schemes), Hyperbolic equation, solution of wave equation

Learning Outcomes: At the end of the unit, the student will be able to:
- Define heat and wave equations (L1)

- Understand the concept of explicit and implicit schemes to solve heat and wave equations (L2)

Prescribed Textbooks:

1. A.R. Vasista and J.N. Sharma, Linear Algebra, Krishna Prakashan Media, 2019
2. S. Lang, Linear Algebra, 3rd edition, Springer, 2004.
3. D W Lewis, Matrix Theory, World Scientific, 1991.
4. B. S. Grewal, Numerical Methods in Engineering & Science, 9/e, Khanna Publishers, 2010.

Reference Books:

1. K. Janich, Linear Algebra, Springer, 1994.
2. B. Koleman and D Hill, Elementary Linear Algebra, 9/e, Pearson, 2007.
3. S.S. Sastry, Introductory Methods of Numerical Analysis, 7/e, PHI Publishers, 2014.

Course Outcomes:

Upon successful completion of the course, the student will be able to	Blooms Level of Learning
1. understand the concept of vector spaces	L2
2. understand the concept of Linear transformation	L2
3. apply numerical methods to solve algebraic equations	L3
4. Apply numerical techniques to solve partial differential equations.	L3
5. use numerical methods to solve engineering problems	L3

CO-PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC5BT.1	2	2	-	-	-	-	-	-	-	-	-	2
20AC5BT.2	3	3	-	-	-	-	-	-	-	-	-	3
20AC5BT.3	3	3	-	-	-	-	-	-	-	-	-	3
20AC5BT.4	3	3	-	-	-	-	-	-	-	-	-	3
20AC5BT.5	2	2	-	-	-	-	-	-	-	-	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Artificial Intelligence and Data Science

Title of the Course	Foundations of Artificial Intelligence and Data Structures
Category	OEC
Course Code	20A305GT
Year	III B. Tech
Semester	I Semester
Branch	CE, EEE, ME & ECE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To comprehend the building blocks of AI in terms of intelligent agents.
- To understand the main approaches of artificial intelligence such as heuristic search, game search and logical inference.
- Fundamental knowledge of concepts underlying data science and give a hands-on experience with real-world data analysis.
- Demonstrate an understanding of statistics and machine learning concepts that are vital for data science.
- Critically evaluate data visualizations based on their design and use for communicating stories from data

Unit 1 Introduction **9**

What is AI? Foundations of AI, History of AI, Agents and environments, The nature of the Environment, structure of agents, Problem solving Agents, Problem Formulation, Uninformed Search Strategies.

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

- Understands the basics of AI and Intelligent Systems (L2)
- Represents the problem formulation in real world environment (L3)

Unit 2 Informed Search methods **9**

Informed search methods – heuristic Functions, Hill Climbing, Simulated Annealing, A*, Performance Evaluation. Constrained Satisfaction Problems: Constraint Satisfaction Problems like – map Coloring, Crypt Arithmetic, and Back tracking for CSP, Local Search. Adversarial search techniques.

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

- Solves a problem for solution using state space search (L5)
- Learns different search methods for problem solving (L1)

Unit 3 Introduction to Data Science **9**

What is Data Science: Big Data and Data Science hype – and getting past the hype, why now? – Deification, Current landscape of perspectives, Skill sets needed

Statistics for Data science: Populations and samples, Statistical modeling, probability distributions, fitting a model, Data Description, Probability, Distributions -Discrete and Continuous Distributions, Hypothesis testing, Regression Models – Linear and Multiple Regression models.

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

- Understands the fundamental concepts of Data Science (L2)
- Apply the statistical methods for Data science problems (L3)

Unit 4 Data exploration and Data Learning algorithms **9**

Exploratory Data Analysis (EDA), Philosophy of EDA, tools for EDA, The Data Science Process, Feature Selection, Feature Generation and Extraction - Feature Selection algorithms – Filters; Wrappers.

Data Learning algorithms: Machine Learning Algorithms, Three Basic Algorithms - Linear Regression - k-Nearest Neighbors (k-NN) - k-means – SVM, Naïve Bayes, Logistic Regression.

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

- Performs Exploratory Data Analysis for feature selection and decision making. (L5)

- Understands different Data Learning algorithms (L2)

Unit 5 Data visualization 9

Data visualization and presentation: Basic principles, ideas and tools for data visualization, Examples of inspiring (industry) projects.

Applications of Data science in Business, Insurance, Energy, Health care, Biotechnology, Manufacturing, Utilities, Telecommunication, Travel, Governance, Gaming, Pharmaceuticals, Geospatial analytics and modeling

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

- Design visual representations for processed data (L6)
- Apply data science methods in different application domains (L3)

Prescribed Text Books:

1. Stuart Russelland Peter Norvig, Artificial Intelligence: A Modern Approach, 2ndEdition, Pearson Publication.
2. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk from the Frontline. O'Reilly Edition, 2014.

Reference Books:

1. Rich,E. and Knight,K.,"Artificial Intelligence", Tata McGraw-Hill
2. GeorgeLugar,"AI-StructuresandStrategiesforComplexProblemSolving",4/e,2002,PearsonEducation
3. RobertJ.Schalkolf,ArtificialIntelligence:anEngineeringapproach,McGrawHill,1990
4. PatrickH.Winston,ArtificialIntelligence,3rdedition,Pearson
5. Jure Leskovek, Anand Rajaraman and Jerey Ullman. Mining of Massive Datasets. V2.1 Cambridge University Press. 2014
6. Foster Provost and Tom Fawcett. Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking. ISBN 1449361323. 2013

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the importance of artificial Intelligence in real world environment.	L1, L2
2. Apply the artificial intelligence algorithms for problem solving	L3
3. Understand the key concepts, notations in data science and implement the standard methods of data analysis and decision making	L2, L3
4. Demonstrate the problem of knowledge extraction as combinations of data filtration, analysis and exploration methods	L3
5. Understand the importance of data visualization and the design and use of many visual components for effective communications and applications of data visualization in various domains.	L5, L6

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A305GT.1	3	3	-	-	-	3		-	3	2	-	2	3	-	-
20A305GT.2	3	3	3	3	-	3	2	-	3	-	-	2	-	-	-
20A305GT.3	3	-	-	-	-	-	-	-	3	-	-	3	3	-	-
20A305GT.4	3	3	3	-	3	-	-	-	3	-	3	3	3	3	3
20A305GT.5	3	3	3	-	3	-	-	-	3	3	3	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Artificial Intelligence and Data Science

Title of the Course Machine Learning
Category OEC
Course Code 20A305HT

Year III B. Tech
Semester I Semester
Branch CE, EEE, ME & ECE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
- Formulate machine learning problems corresponding to different applications.
- Understand machine learning algorithms along with their strengths and weaknesses.
- Understand the basic theory underlying machine learning.
- Apply machine learning algorithms to solve problems of moderate complexity.
- Understand different types of learning approaches.

Unit 1 Introduction **9**

Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias

Learning Outcomes: At the end of the unit, the student will be able to:
- Explore how to build computer programs that improve their performance at some task through experience. (L4)
- Analyze sample complexity and computational complexity for several learning Problems (L4)

Unit 2 Decision Tree learning & Artificial Neural Networks **9**

Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning

Artificial Neural Networks – Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptrons, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition Advanced topics in artificial neural networks

Learning Outcomes: At the end of the unit, the student will be able to:
- Analyze artificial neural networks as one of the most effective learning methods currently known to interpret complex real-world sensor data (L4)
- Analyze and solves learning problem using Decision Tree (L5)

Unit 3 Bayesian learning & Genetic Algorithms **9**

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm

Genetic Algorithms – Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

Learning Outcomes: At the end of the unit, the student will be able to:
- Apply the principles of Probability for classification as an important area of Machine Learning Algorithms (L3)
- Illustrates the use of the genetic algorithm approach, and examine the nature of its hypothesis space search (L3)

Unit 4 Learning Sets of Rules & Analytical Learning 9

Learning Sets of Rules – Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution Analytical Learning - Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge.

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

- Analyze the Instance based algorithms can be used to overcome memory complexity and overfitting problems. (L4)
- Infer the significance of Domain Theories (L2)

Unit 5 Reinforcement Learning 9

Reinforcement Learning – Introduction, The Learning Task, Q Learning, Non-Deterministic Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming

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

- Infer that the combined methods outperform both purely inductive and purely analytical learning methods (L3)
- Recognize the importance of Reinforcement Learning in the industry (L1)

Prescribed Text Books:

1. Machine Learning – Tom M. Mitchell, - MGH
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC) Reference

Reference Books:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the basic knowledge about the key algorithms of machine learning	L1
2. Learn and use different machine learning algorithms	L2
3. Apply various machine learning algorithms Bayesian learning and genetic approaches	L3
4. Design the classification, pattern recognition, optimization and decision problems using machine learning algorithms	L4
5. Analyze different types of learning approaches	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A305HT.1	3	3	3	1	-	1	-	-	1	-	-	3	3	3	-
20A305HT.2	3	-	3	-	3	-	-	-	-	-	-	3	3	3	-
20A305HT.3	3	3	3	-	3	-	-	-	-	-	-	-	3	-	-
20A305HT.4	3	3	3	-		-	-	-	-	-	-	3	3	-	-
20A305HT.5	3	-	3	-	3	-	-	-	-	-	-	3	3	3	-

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

Title of the Course Data Structures using Python
Category OEC
Course Code 20A55FT

Year III B. Tech.
Semester I Semester
Branch CE, ME, EEE and ECE

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Prerequisite: Prerequisite for this course is python programming language

Course Objectives: This course will
- To learn basic of data structures.
- To analyze algorithms and understand sets, maps, linked list using python programming
- To apply recursion in python programming and understand hashing operation
- To learn the implementation of binary trees, binary search trees and AVL trees.

Unit 1 **7**

Introduction to Data structures, definition, types of data structures, Array-Based Sequences: Python's Sequence Types, Low-Level Arrays, Dynamic Arrays and Amortization, Efficiency of Python's Sequence Types, Using Array-Based Sequences, Multidimensional Data Sets.

Learning Outcomes: At the end of the unit, the student will be able to
- Understand the definition of data structures (L2)
- Remember various data structures (L1)

Unit 2 **11**

Linked list structures: The Singly Linked List, Double linked list, Stacks. The Stack Abstract Data Type, Simple Array-Based Stack Implementation, Reversing Data Using a Stack, Queue, The Queue Abstract Data Type, Array-Based Queue Implementation

Learning Outcomes: At the end of the unit, the student will be able to
- Understand the linear data structure linked list (L2)
- Illustrate Abstract Data types for various data structures (L4)

Unit 3 **9**

Recursion: Recursive functions, properties of recursion, recursion works, recursive applications-recursive binary search, towers of Hanoi, exponential operation. Sorting: Merge sort, Quick sort

Learning Outcomes: At the end of the unit, the student will be able to
- understands the importance of recursion (L2)
- use recursion in various examples (L3)

Unit 4 **9**

Binary Trees: The Tree structure, The binary search tree, The Priority Queue Abstract Data Type, Implementing a Priority Queue, heap sort.

Learning Outcomes: At the end of the unit, the student will be able to
- explain binary tree data structure (L3)
- demonstrate priority queue and heap sort (L2)

Unit 5 **9**

Pattern-Matching Algorithms: Brute Force, The Boyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Tries: Standard Tries, Compressed Tries, Suffix Tries.Graphs, Graph Traversals, Depth-First Search, Breadth-First Search.

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

- describe the pattern matching algorithms (L3)
- justify the importance of graph data structure (L4)

Prescribed Text Books:

1. Data Structures and Algorithms in Python, Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, Wiley Publications
2. Data Structures and Algorithms using Python, RanceD. Necaise, Wiley Publications

Reference Books:

1. Python Programming using problem solving approach, Reema Thareja, Oxford University press
2. Core Python Programming, R. Nageswara Rao, Dream Tech Press (Wiley India), 2017 Edition
3. Problem solving with algorithms and data structures using python, Bradley Miller, David L. Ranum, Franklin, Beedle& Associates incorporated, independent publishers.

Course Outcomes:

At the end of the course student will be able to	Blooms Level of Learning
1. Remember and understand the basics data structures.	L2
2. Illustrate Abstract Data types for various data structures	L4
3. use recursion in different examples	L3
4. explain binary tree, priority queue data structure	L3
5. justify the importance of pattern matching, tires and graph data structure	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A55FT.1	3	3	3	-	-	-	-	-	-	-	-	2	-	-	-
20A55FT.2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
20A55FT.3	3	3	3	-	3	-	-	-	-	-	-	2	-	-	-
20A55FT.4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
20A55FT.5	3	3	3	-	3	-	-	-	-	-	-	-	-	-	-

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

Title of the Course Data Base Management System
Category OEC
Course Code 20A55GT

Year III B. Tech
Semester I Semester
Branch CE, ME, EEE and ECE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To understand the role and uses of DBMS in an organization.
- To understand fundamental concepts of Database Management Systems like database design, database languages, and database-system implementation.
- To construct simple and moderately advanced database queries using Structured Query Language (SQL).
- To understand and successfully apply logical database design principles, including E-R diagrams and database normalization techniques.
- To explain the principle of transaction management design.

Unit 1 **9**

Introduction: Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Data Storage and Querying, Transaction Management, Data Base Architecture, Database Users and Administrators, History of Database Systems.

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

- Explain the Features of Database Management Systems, Architecture of database systems.(L2)
- Define the role of database users (L1)

Unit 2 **10**

Database Design: Database Design and ER Diagrams, Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model, Case study: The Internet Shop.

The Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity Constraints, Querying Relational Data, Logical Data Base Design: ER to Relational.

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

- Develops an Entity-Relationship model based on user requirements.(L5)
- Defines the basics of the relational data model. (L1)

Unit 3 **9**

SQL AND PL/SQL: Introduction to SQL, Data Definition Commands, Data Manipulation Commands, Select Queries, Virtual Tables: Creating View, Altering View, Updating View, Destroying View, Relational Set Operators, SQL Join Operators, Sub Queries and Correlated Queries, Aggregate Functions, Procedural SQL: Stored Procedures, Stored Functions, Triggers, Cursors.

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

- Designs SQL queries to create database tables and make structural modifications. (L5)
- Define and enforces integrity constraints on a database. (L1)

Unit 4 **12**

Introduction to Schema Refinement: Problems Caused by Redundancy, Decompositions, Problems Related to Decomposition, Functional Dependencies, Reasoning about FDs, Normal Forms: 1NF, 2NF, 3NF, BCNF, Properties of Decomposition: Lossless Join Decomposition, Dependency Preserving Decomposition, Multivalued Dependencies, 4 NF.

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

- Describes Functional Dependency and Functional Decomposition. (L2)
- Applies various Normalization techniques for database design improvement. (L3)

Unit 5 **9**

ACID Properties: Consistency and Isolation, Atomicity and Durability, Transactions and Schedules, Concurrent Execution of Transactions, Lock-Based Concurrency Control, Performance of Locking, Transaction Support in SQL.

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

- Applies transaction processing mechanisms in relational databases.(L3)
- Explain the Concurrency Control and Recovery Algorithms. (L2)

Prescribed Text Books:

1. Silberschatz, Korth, Sudarshan, Database System Concepts. McGraw Hill, 5th Edition.
2. C.J.Date, Introduction to Database Systems. Pearson Education.

Reference Books:

1. RaghuRamaKrishnan, Johannes Gehrke, Database Management Systems, McGraw Hill, Third Edition.
2. Elmasri,Navate, Fundamentals of Database Systems. Pearson Education.
3. Peter Rob, A. Ananda Rao, Carlos Coronel, Database Management Systems, CENGAGE Learning.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Memorize and recall the basic concepts of Database Systems to examine the applications of database systems.	L1
2. Demonstrate an Entity-Relationship (E-R) model from specifications and to convert the transformation of the conceptual model into corresponding logical data structures.	L2
3. Illustrate database concepts in structure query languages.	L3
4. Analyze the problems with redundancies and eliminate redundancies in a database schema using normalization.	L4
5. Judge the need of concurrency control in transaction management concepts in database systems.	L5

CO PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A55GT .1	-	3	-	3	3	-	-	-	-	-	-	-	3	-	-
20A55GT .2	-	3	3	3	3	-	-	-	-	-	-	-	3	-	3
20A55GT .3	-	3	3	3	3	-	-	-	-	-	-	-	3	-	3
20A55GT .4	-	3	3	3	3	-	-	-	-	-	-	-	3	-	3
20A55GT .5	-	3	3	3	3	-	-	-	-	-	-	-	3	-	3

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

Title of the Course Electronic Circuits and its Applications
Category OEC
Course Code 20A45ET

Year III B. Tech
Semester I Semester
Branch EEE, CE & ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
- To analyze and design the transistor and feedback amplifiers.
- To understand and analyze the concepts of oscillators

Unit 1 Single Stage Amplifiers **10**
Classification of Amplifiers - Distortion in amplifiers, Analysis of CE, CC and CB configurations with simplified hybrid model, Analysis of CE amplifier with emitter resistance and emitter follower, Miller's theorem and its dual, Design of single stage RC coupled Amplifier using BJT.
Learning Outcomes: At the end of the unit, the student will be able to**:**
- Understand the concepts of basic transistor amplifier circuits. (L2)
- Design and analysis of single stage amplifiers using BJTs (L6)

Unit 2 Multistage Amplifiers **10**
Analysis of Cascaded RC coupled BJT amplifiers, Cascode Amplifier, Darlington Pair, Different Coupling Schemes used in Amplifiers - RC coupled amplifiers, Transformer Coupled Amplifier, Direct Coupled Amplifier.
Learning Outcomes: At the end of the unit, the student will be able to:
- Understand the purpose of cascading single stage amplifiers (L2)
- Analyse the different types of amplifiers, operation and it's characteristics. (L4)

Unit 3 Feedback Amplifiers **12**
Concept of feedback amplifiers, General characteristics of negative feedback amplifiers, effect of feedback on amplifier characteristics. Voltage series, voltage shunt, current series and current shunt feedback amplifiers with discrete components (Topologies).
Learning Outcomes: At the end of the unit, the student will be able to :
- Understand the concepts of feedback amplifiers (L2)
- Analyse the effect of negative feedback on amplifier characteristics (L4)
- Design and analysis of various feedback amplifiers (L6)

Unit 4 Oscillators 10
Condition for oscillations, Oscillator types, Frequency and amplitude stabilityof oscillators, LC oscillators - Hartley and Colpitts oscillators, RC phase shift and Wein bridge oscillators, Crystal Oscillators.
Learning Outcomes: At the end of the unit, the student will be able to:
- Understand the basic principle of oscillator circuits.(L2)
- Design and Analysis of different oscillator circuits (L6)

Unit 5 Large Scale Amplifiers **8**
Classification of Power amplifiers – Class A power Amplifiers – Direct coupled and Transformer Coupled, Class B power Amplifiers – Push – pull and Complementary Symmetry - Transistor power dissipation, Power and Efficiency calculations, Distortion of Power Amplifiers.

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

- Understand the concepts of different power amplifiers. (L2)
- Determine the efficiencies of various power amplifiers (L3)

Prescribed Text Books:

1. Millman and Christos C. Halkias- "Integrated Electronics", Mc Graw-Hill, 1972.
2. Robert T. Paynter- "Introductory Electronic Devices and Circuits", Pearson Education, 7th Edition.

Reference Books:

1. Robert L. Boylestad and Louis Nashelsky - "Electronic Devices and Circuits Theory", Pearson/Prentice Hall, 9th Edition, 2006.
2. Donald A. Neumann- "Electronic Circuit Analysis and Design", Mc Graw Hill
3. "Micro Electronic Circuits" Sedra and Smith, Oxford University Press

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Analyze the single stage and multi-stage amplifiers using h-parameter model at low frequencies	L4
2. Understand the feedback amplifiers and oscillators	L2
3. Analyse the concepts of large signal amplifiers	L4
4. Understand the working principle and operation of oscillators	L2
5. Analyze the concepts of large signal amplifiers	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A45DT.1	3	3	2	3	3	1	-	-	2	-	-	-	-	-	-
20A45DT.2	3	3	2	3	3	1	-	-	2	-	-	-	-	-	-
20A45DT.3	1	3	3	2	2	-	-	-	2	-	-	-	-	-	-
20A45DT.4	1	3	3	2	2	-	-	-	2	-	-	-	-	-	-
20A45DT.5	3	3	3	2	2	1	-	-	2	-	-	-	-	-	-

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

Title of the Course Introduction to Communication Systems
Category OEC
Course Code 20A45FT

Year III B. Tech
Semester I Semester
Branch CE, EEE & ME

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
1. To learn the fundamental concepts of Analog and Digital communication systems
2. To understand the different analog and digital modulation and demodulation techniques
3. To know the effect of noise in communications

Unit 1 Amplitude Modulation-I **9**
Elements of communication system, need for modulation, types of modulation, amplitude modulation single tone modulation, power relations in am waves, generation and detection of am waves
Learning Outcomes: At the end of the unit, the student will be able to:
- Describe the Elements of Analog communication system (L2)
- solve different power relations in AM (L3)

Unit 2 Amplitude Modulation-II **11**
DSB-SC: generation and detection of DSB-SC, SSB-SC: Ggeneration and detection of SSB-SC, vestigial sideband modulation: Ggeneration and detection of VSB waves.
Learning Outcomes: At the end of the unit, the student will be able to:
- Describe generation and detection methods (L2)
- Compare different Amplitude modulation methods (L4)

Unit 3 Angle Modulation **9**
Basic concepts of Frequency Modulation, Single tone frequency modulation, Narrowband FM, Wideband FM, Generation of FM Waves and Detection of FM Waves
Learning Outcomes: At the end of the unit, the student will be able to :
- Classify different angle modulation methods (L2)
- Distinguish Amplitude modulation with Angle Modulation (L2)

Unit 4 Pulse Digital Modulation **9**
Elements of digital communication system, Elements of PCM, Bandwidth requirements of PCM, Noise in PCM Systems, Differential PCM systems (DPCM), Delta modulation systems and drawbacks
Learning Outcomes: At the end of the unit, the student will be able to:
- Discuss the Elements of digital communication system (L4)
- Analyze Noise in PCM and DM (L4)
- Distinguish and Design different Modulation Schemes(L4)

Unit 5 Digital Carrier Modulation Schemes 9
Introduction, Binary ASK Signaling Scheme-Generation and detection methods, Binary FSK Signaling Scheme-Generation and detection methods, Binary PSK Signaling Scheme-Generation and detection methods, DPSK.
Learning Outcomes: At the end of the unit, the student will be able to:
- Classify and review different generation methods for Digital Modulation schemes (L2)
- Classify and review different detection methods for Digital Modulation schemes (L2)

Prescribed Text Books:

1. Simon Haykin, John Wiley- Principles of Communication systems , 2nd Ed.,
2. K. Sam Shanmugam – Digital and Analog Communication Systems, Wiley, 2010.
3. Simon Haykin-Digital Communication, Wiley, 2006

Reference Books:

1. H Taub & D. Dchilling, Gautam Sahe- Principles of Communication Systems, TMH, 2007 3rd Edition
2. John G. Proakis, Masood Salehi- Fundamentals of Communication Systems PEA, 2006.
3. R.P.Singh & S.D.Sapre- Communication Systems Analog & Digital, TMH, 2008

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Design simple systems for generation and detection of AM, DSB, SSB and VSB signals	L6
2. Understand the concepts of the angle modulation & demodulation along with noise analysis.	L2
3. Analyze the various pulse amplitude modulation and demodulation techniques	L4
4. Understand the different digital modulation techniques	L2
5. Understand the different digital carrier modulation techniques	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A45ET.1	3	1	-	-	-	1	-	-	-	3	-	2	-	-	-
20A45ET.2	3	3	1	-	-	1	-	-	-	2	-	2	-	-	-
20A45ET.3	3	3	1	-	-	1	-	-	-	2	-	2	-	-	-
20A45ET.4	3	3	2	2	2	-	-	-	-	3	2	2	-	-	-
20A45ET.5	3	3	2	2	2	-	-	-	-	3	2	2	-	-	-

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

Title of the Course	Energy Auditing Conservation and Management
Category	OEC
Course Code	20A25ET
Year	III B. Tech
Semester	I Semester
Branch	CE, ME & ECE

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- To illustrate the present scenario of Energy Production and laws associated with it
- To illustrate the Energy conservation Codes
- To develop Management skills and communications of Energy manager/ Energy Auditor
- To illustrate the techniques, procedures, evaluation and energy audit reporting
- To evaluate life cycle costing analysis and return on investment on energy efficient technologies.

Unit 1 Energy Scenario **9**

Global and Indian energy Scenario. Energy production, consumption and pricing. Long-term energy scenario. Salient features of Electricity Act 2003. Energy Conservation Act – 2001 and its features. Energy poverty and Human Development Indices, Energy and Human Development, Energy development index; Fing the link between economic growth and energy consumption.

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

- Discuss the Scenario of energy production (L2)
- Explain the Electricity Act 2003 (L2)

Unit 2 Energy conservation **9**

Energy conservation areas, Energy transmission and storage, Plant Lecture wise energy optimization Models, Data base for energy management, Energy conservation through controls, Computer aided energy management, Program organization and methodology. Energy environment interaction, Energy Conservation in Buildings, Energy Efficiency Ratings & ECBC (Energy Conservation Building Code).

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

- Describe the Energy conservation through controls (L2)
- Discuss the Energy conservation in building with efficiency ratings and code (L2)

Unit 3 Energy Management **9**

History of Energy Management, Definition and Objective of Energy Management and its importance. Need of energy management, General Principles of Energy Management, Energy Management Skills, and Energy Management Strategy. Organizing, Initiating and Managing an energy management program. Roles, responsibilities and accountability of Energy Managers

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

- Explain the importance of Energy management. (L2)
- Discuss the roles and responsibility of Energy manager (L2)

Unit 4 Energy Audit **9**

Energy audit concepts, Definition, Need and Types of energy audit. Energy Audit Approach and Methodology. Systematic procedure for technical audit. Describing energy audit costs. Duties and
responsibilities of energy auditors. Energy audit instruments and their usage for auditing. Report-writing, preparations and presentations of energy audit reports.

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

- Discuss the concepts of Energy Audit and its types (L2)

- Write the Energy Audit in the form of Report. (L1)

Unit 5 Economic Analysis **9**

Economic analysis methods-cash flow model, time value of money, evaluation of proposals, pay-back method, average rate of return method, internal rate of return method, present value method, life cycle costing approach, Case studies.

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

- Analyze the benefits of adapting energy efficient equipment's with respect to investment. (L4)
- Analyze the benefits of usage of power factor equipment. (L4)

Prescribed Text Books:

1. Amlan Chakrabarti, Energy Engineering and Management, PHI learning, 2nd edition, 2011.
2. Smith CB, Energy Management Principles, science direct, 2nd edition, 2016.
3. Hamies, Energy Auditing and Conservation; Methods, Measurements, Management & Case discuss. Hemisphere Pub. Corp: Washington, 1980
4. Umesh Rathore, Energy management, S.K.Kataria &Sons,2nd edition,2014

Reference Books:

1. W.R.Murphy, G.Mckay, Energy Management, Butterworth-Heinemann Ltd, 2nd edition, 2009
2. Archie, W. Culp, Principles of Energy Conservation, Mc Graw Hill, 1979
3. Munasinghe, Mohan Desai, Ashok V, Energy Demand: Analysis, Management and Conservation, Wiley Eastern Ltd., New Delhi.1990.
4. A. J. McMichael, D. H. Campbell-Lendrum, C. F. Corvalan, K. L. Ebi, A. Githeko, J. D. Scheraga, A. Woodward, Climate Change and Human Health Risks and Responses, 2003.

Web Resources:

1. www.bee-india.org
2. https://www.youtube.com/watch?v=6vOg-u7c1IE
3. https://www.youtube.com/watch?v=M1zijCmeXJg
4. https://www.youtube.com/watch?v=2zWt-pBCU2I&t=80s

Course Outcomes:

At end of the course, student will be able to	Blooms Level of Learning
1. Describe the energy scenario and laws associated with it.	L2
2. Discuss the technical and commercial aspects of energy conservation	L2
3. Analyze the energy management	L4
4. Discuss the significance and procedure for Energy Audit.	L2
5. Evaluate the pay back periods for energy savings equipment	L6

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20A25ET.1	3	2	-	2	-	-	3	-	-	-	-	2
20A25ET.2	2	2	-	2	-	-	2	-	-	-	-	1
20A25ET.3	3	2	-	2	-	-	2	-	-	-	-	-
20A25ET.4	3	2	-	2	-	-	2	-	-	-	-	1
20A25ET.5	2	2	-	1	-	-	2	-	-	-	-	1

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

Title of the Course Electric Vehicles
Category OEC
Course Code 20A25FT

Year III B. Tech
Semester I Semester
Branch CE, ME & ECE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To explain the concepts and configurations of electric vehicles
- To describe different electric propulsion systems and energy storage devices
- To discuss the different types of electrical vehicles.

Unit 1 Introduction to Electric Vehicles 8

A brief history of Electric Vehicles (EV), Types of EV, advantages over conventional vehicles, limitations of EV, impact on environment of EV technology, disposal of battery, cell and hazardous material and their impact on environment.

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

- Describe the history of electric vehicles (L2)
- Describe electric vehicle configuration and its components (L2)
- Describe the impact on environment of electric vehicles technology (L2)

Unit 2 Power Management and Energy Sources of EV 8

Power and Energy management strategies and its general architecture of EV, various battery sources, energy storage, battery-based energy storage and simplified models of battery, Battery Management Systems (BMS), fuel cells.

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

- Describe the general architecture of EV (L2)
- Describe various battery energy sources of EV (L2)

Unit 3 Power Electronics in EV 8

Introduction, various power electronics converter topologies and its comparisons, Control of converter operations in EV, battery chargers used in EV.

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

- Describe the various power electronics converter topologies (L2)
- Describe the control of converter operations in EV (L2)

Unit 4 DC and AC Machines & Drives in EV 8

Various types of motors, selection and size of motors, Induction motor drives and control characteristics, Permanent magnet motor drives and characteristics, Brushed & Brushless DC motor drive and characteristics, switched reluctance motors and characteristics.

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

- Describe the various types of motors for EV (L2)
- Describe the characteristics of AC & DC motors (L2)

Unit 5 Design Considerations of EV 8

Design parameters of batteries, ultra-capacitors and fuel cells, aerodynamic considerations, calculation of the rolling resistance and the grade resistance, calculation of the acceleration force, total tractive effort, torque required on the drive wheel, transmission efficiency.

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

- Describe the design parameters for EV (L2)
- Describe calculation of tractive effort in EV (L2)

Prescribed Text Books:

1. Iqbal Hussain, "Electric and Hybrid Vehicles Design Fundamentals", 1st Edition, CRC Press, 2003.
2. James Larminie, John Lowry "Electric Vehicle Technology Explained", 1st Edition, John Wiley and Sons, 2003.
3. Chris Mi, M. Abul Masrur, David Wenzhong Gao, "Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives", Wiley publication ,2011
4. Allen Fuhs, "Hybrid Vehicles and the future of personal transportation", CRC Press, 2009.

Reference Books:

1. Web course on "Introduction to Hybrid and Electric Vehicles" by Dr. Praveen Kumar and Prof. S Majhi, IIT Guwahati available on NPTEL at https://nptel.ac.in/courses/108/103/108103009/.
2. Video Course on "Electric Vehicles" by Prof. Amit Kumar Jain, IIT Delhi available on NPTEL at https://nptel.ac.in/courses/108/102/108102121/

Web Resources:

1. https://nptel.ac.in/courses/108/106/108106170/
2. https://nptel.ac.in/courses/108/102/108102121/
3. https://nptel.ac.in/courses/108/103/108103009/
4. https://nptel.ac.in/courses/108/106/108106182/

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Explain the operation of electric vehicles	L2
2. Choose a suitable drive scheme for developing an electric vehicle depending on resources	L1
3. Choose proper energy storage systems for vehicle applications.	L1

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20A25FT.1	-	2	-	3	-	-	2	-	3	-	-	-
20A25FT.2	3	-	-	2	-	3	-	-	3	-	-	-
20A25FT.3	3	2	2	-	-	-	-	-	2	-	-	-

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

Title of the Course	Non-Conventional Sources of Energy
Category	OEC
Course Code	20A35ET
Year	III B. Tech
Semester	I Semester
Branch	CE, EEE, ECE & AIDS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To grasp the role and potential of new and renewable source
- To recognize the principle, storage and applications of solar energy
- To understand the sources and potentials of wind energy and also to comprehend the Principles of Bio-Conversion of bio-mass and bio-gas uses.
- To explain the principle, working procedure and types of geothermal energy, ocean energy and tidal & wave energy.
- To know the knowledge on direct energy conversion.

Unit 1 Principles of Solar Radiation **9**

Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation, potential in India

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

- Understand types of energy resources. (L2)
- Understand the different types of measuring instruments of solar radiation. (L2)

Unit 2 Solar Energy Collectors **9**

Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors. Solar Energy Storage And Applications: Different methods, Sensible, latent heat and tratified storage, solar ponds. Solar Applications solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion, potential in India.

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

- Understand different types of solar collectors. (L2)
- Understand the different types of energy storage systems and applications. (L2)

Unit 3 Wind Energy **8**

Sources and potential in India, horizontal and vertical axis wind mills, performance characteristics, Betz criteria. Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, and economic aspects, potential in India

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

- Understand the type of winds and windmills components. (L2)
- Understand the types of biomass conversion technologies and biogas digesters. (L2)

Unit 4 Geothermal Energy **0**

Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics, potential in India.

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

- Classify the Geothermal resources. (L2)

- Understand OTEC, wave and tidal energy extraction methods. (L2)

Unit 5 Direct Energy Conversion 9

Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating Conditions.

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

- Classify the Direct energy conversion techniques. (L2)
- Understand the concept and working of MHD generator and Fuel cells. (L2)

Prescribed Text Books:

1. Tiwari and MK.Ghosal, Renewable energy resources: Basic principles and applications, Narosa publications 2005, ISBN 10: 1842651250 ISBN 13: 9781842651254
2. G.D. Rai, Non-Conventional Energy Sources, khanna publications, 2011, ISBN 10: 8174090738, ISBN 13: 9788174090737

Reference Books:

1. Twidell & Weir, Renewable Energy Sources, Routledge , 3rd Ed.2015,ISBN 9780367200756
2. Non-Conventional Energy Resources, B.H.Khan, McGrawHIll, 2015, ISBN 1259081397, 9781259081392

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Create awareness on role and potential of new and renewable source and basics of solar energy.	L1, L2
2. Acquire the knowledge on different types of collectors and storage systems of solar energy and their applications	L1, L2
3. Achieve sufficient knowledge on Wind energy and Bio-mass energy.	L1, L2
4. Familiarize with the Geothermal and Ocean energy concepts and their potentiality	L1, L2
5. Gain the knowledge on direct energy conversion	L1, L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A35ET.1	3	2	-	-	-	3	3	-	-	-	-	3	-	-	-
20A35ET.2	3	3	-	1	3	3	-	-	-	-	-	3	-	-	-
20A35ET.3	3	2	3	-	-	3	3	-	-	-	-	3	-	-	-
20A35ET.4	3	3	-	-	3	3	-	-	-	-	-	3	-	-	-
20A35ET.5	3	3	-	-	3	3	-	-	-	-	-	3	-	-	-

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

Title of the Course	Industrial Management & Entrepreneurship
Category	OEC
Course Code	20A35FT
Year	III B. Tech
Semester	I Semester
Branch	CE, EEE, ECE & AIDS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To create awareness to learn principles, concepts, functions of management
- To learn the concepts of financial management.
- To learn the concepts of production, material &project management.
- To get awareness on Human Resource Management and its functions
- To analyze the need of entrepreneur development.

Unit 1 General management 10

Management definition, functions of management and principles of management. Forms of Business Organization: Salient features of Sole Proprietorship, Partnership, Joint Stock Company; Private Limited and Public Limited companies; Cooperative and Government owned companies; Merits and Demerits of above types;
Marketing Management: Functions of Marketing; Concepts of Selling and Marketing- Difference; Market Research; Product pricing; Distribution channels; Marketing mix (4 Ps); Advertising and sales promotion; Product life cycle

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

- explain concepts of management (L2)
- explain form Business Organization(L2)
- discuss 4Ps of Marketing (L2)

Unit 2 Financial Management 8

Concept of time value of money; Interest formulae; Present and Future worth amounts for different cash flow patterns; Evaluation of alternative investment proposals (Capital budgeting); Types of Capital-Fixed and Working capital; Working capital management- Factors and Principles; Depreciation- Straight line depreciation, declining balance and Sum of Years digits methods

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

- explain concepts of time value of money, depreciation(L2)
- Evaluation of investment proposals(L3)

Unit 3 Production and Materials Management 12

Functions of Production planning and control; Production systems-Types; Inventory control-Relevant costs, EOQ, Deterministic single item model with static demand, ABC, VED and FSN analysis; Introduction to MRP. Project management, network modeling-probabilistic model, various types of activity-times estimation-programme evaluation review techniques- Critical Path-probability of completing the project, deterministic model, critical path method -critical path calculation-crashing of simple of networks

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

- Production and Materials Management (L2)
- explain the concept of PERT (L4)
- Demonstrate Project Crashing. (L3)

Unit 4 Human Resources Management 7

Concepts of HRM, Functions of personnel management, human resource planning, recruitment, selection,

placement, training and development and performance appraisal. Motivation theories, leadership styles

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

- explain the concept of HRM (L2)
- distinguish between Personnel Management and HRM (L3)
- Discuss Training and Development methods. (L2)

Unit 5 Entrepreneur Development 8

Introduction, Entrepreneurial characteristics, Functions of an Entrepreneur; Factors affecting entrepreneurship, Role of communication in entrepreneurship; Entrepreneurial Development-Objectives, Need of Training for enterprises; Finance for the enterprises; Product, Process and Plant Design- Product analysis and Product Design process. Steps in process design and Plant Design

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

- Outline the functions of an entrepreneur. (L2)
- Discuss product, process & plant design. (L2)

Prescribed Text Books:

1. Industrial Engineering and Operations Management, S.K.Sharma, Savita Sharma and Tushar Sharma.
2. Industrial engineering and production management, Mahajan
3. Operations Management, Joseph G Monk.

Reference Books:

1. Production, Planning and Control, Samuel Eilon.
2. Marketing Management, Phillip Kotler
3. The Essence of Small Business, Barrow colin.
4. Industrial Economics, R.R.Bharatwal
5. Financial Management I.M.Pandey.
6. Projects, Prasanna Chandra.
7. Small Industry Ram K Vepa

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the principles and practices of general management.	L2
2. Understand the various issues of financial management.	L3
3. Acquire knowledge on production and material management & concepts of PERT, CPM & Crashing of simple networks.	L4
4. Understand and apply the functions of personnel management	L3
5. Understand the importance of entrepreneur development	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A35FT.1	3	3	-	-	-	2	-	3	3	3	-	-	3	-	-
20A35FT.2	3	3	-	-	-	-	-	-	-	-	2	-	3	-	-
20A35FT.3	3	3	-	1	-	2	-	3		3	2	-	3	-	-
20A35FT.4	-	-	-	-	-	-	-	3	3	3	-	2	3	-	-
20A35FT.5	3	3	2	-	-	2	1	3	3	-	2	-	3	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Business Administration

Title of the Course Human Resource Management
Category OEC
Course Code 20AE5AT

Year III B. Tech.
Semester I Semester
Branch CE, EEE, ECE & AIDS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- The course is designed broadly to promote understanding of procurement, development, maintenance, evaluation and overall effective utilization of manpower.

Unit 1 Introduction to Human Resource Management 10

Introduction-Definition-Nature of HRM-Scope of HRM-Functions of HRM-Managerial functions and Operative functions-Role of HRM-Personnel Management and HRM-Competitive challenges influencing HRM- Ethical aspects of HRM.

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

- Understand the differences between Personnel and Human resource Management (L2)
- Identify the ethical issues to be followed in the organization (L1)

Unit 2 Manpower Planning , Job analysis and Job design 12

Introduction to Manpower Planning- Nature of HRP-Need and Importance of HRP in Organizations-Factors affecting HRP-HRP process-Barriers to HRP- Human Resource Information System.

Job analysis: Definitions, Nature of Job analysis, process of Job analysis-methods of collecting job data.

Job design: Definition-Factors affecting Job Design-Job design Approaches.

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

- Identify the need of Manpower planning in Organizations' (L1)
- Find the basic requirements of job analysis and job design (L1)

Unit 3 Recruitment and Selection of Human Capital 10

Recruitment: Nature of Recruitment-Purpose and Importance- Factors governing Recruitment-Recruitment process- Sources of Recruitment.

Selection: Nature of Selection-Selection Process- Selection tests-Barriers to effective selection. Placement and orientation.

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

- Determine the requirements of recruitment and selection (L3)
- Prepare himself when attending for different selection tests (L3)

Unit 4 Training and Development 10

Nature of Training and Development-Inputs in Training and development-Benefits of Employee Training-Training Process-Training Methods-Impediments to effective training-Career development: Definition-Initiatives-stages.

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

- Extend the dynamic aspects of training and its applicability for the growth of organization(L2)
- Apply Training methods in order to make training effective(L3)

Unit 5 Evaluation and Compensation management 10

Performance Appraisal: Nature-objectives-Appraisal Process-Methods of Appraisal.

Compensation: Objectives-Objectives of Remuneration-Theories of Remuneration-Wage policy in India-Concept of Wages.

Grievance process- Importance and Approaches of Industrial relations-Collective Bargaining.

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

- Understand the various performance appraisal methods in an Organization(L2)
- Finds ways for evaluating compensation related pay in various organizations(L1)

Prescribed Textbooks:

1. K.Aswathappa, Human Resource Management: Text and cases, The McGraw-Hill Companies, 5th Edition,.
2. P.SubbaRao, Personnel and Human Resource Management, Himalaya Publishing House, 5th Revised Edition.

Reference Books:

1. Noe A.Raymond, John Hollenbeck, Barry Gerhart and Patrick Wright, Human Resource Management, Tata Mc Graw Hill.
2. Ian Beardwell & Len Holden, Human Resource Management, Macmillan India Ltd.
3. Ivansevich, Human Resource Management, Tata McGraw Hill, 10th Edition.
4. Dessler Gary, Human Resource Management, Prentice Hall, 10th Edition.
5. Bernardi, Human Resource Management, Tata McGraw Hill, 4th Edition.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the basics of Human Resource Management.	L2
2. Know the basic requirements of Job and the way of designing the jobs in the organization.	L1
3. Apply different Recruitment and selection techniques in their practical life when attending for recruitment and selection processes.	L3
4. Get awareness of various Training and Development methods in the Organization.	L2
5. Identify various types of performance appraisal methods and compensation designs in the organization.	L1

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AE5AT.1	-	-	-	-	-	-	-	2	-	-	-	3	-	-	-
20AE5AT.2	-	-	1	-	-	-	-	-	3	-	-	3	-	-	-
20AE5AT.3	-	-	1	-	-	-	-	-	-	-	3	3	-	-	3
20AE5AT.4	-	-	-	-	-	-	-	3	-	-	3	-	-	-	3
20AE5AT.5	2	-	-	-	-	-	-	-	-	-		3	-	3	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Business Administration

Title of the Course	Intellectual Property Rights
Category	OEC
Course Code	20AE5BT
Year	III B. Tech
Semester	I Semester
Branch	CE, EEE, ECE & AIDS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To introduce fundamental aspects of Intellectual property rights to student who are going to play a vital role in development and management of innovative projects in industries
- To disseminate knowledge of kinds and types of intellectual property in India and abroad and registration aspects.
- To get aware about current trend in IPR and government steps in fostering IPR

Unit 1 Concept of Property **12**

Meaning of Property, Kinds of property: Movable and Immovable property; Tangible and Intangible property; Intellectual property; Private and Public property. Possession and ownership.

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

- Explain the meaning of property and kinds of properties (L1)
- Able to distinguish between different types of properties (L4)

Unit 2 Intellectual Property Rights **12**

Introduction and the need for Intellectual Property Rights (IPR), IPR in India – Genesis and Development, Forms of Intellectual Property- Copyright, Trademarks, Patents, Designs, Geographical Indicators, Merchandise, Franchise and Forms of Unfair Competition. Competing rationales of the legal regimes for the protection of Intellectual Property.

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

- To get awareness of need for Intellectual Property Rights (IPR) (L1)
- To acquire knowledge in different forms of Intellectual Property- Copyright, Trademarks, Patents, Designs and Geographical Indicators (L2)

Unit 3 Copyrights & Trademarks **14**

Copy Right: Meaning of Copyright, Copyright in literary, dramatic, musical work and cinematograph films Ownership, Assignment, Author's special rights, Importation and infringement, Fair use provisions. Trademarks: Definition; conception of trademarks, Registration, Distinction between trademark and property mark, Standards of proof in passing off action.

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

- understand the meaning of Copyright and infringement (L1)
- find the importance of Trademarks and its registration(L1)

Unit 4 Patents, Designs and Geographical Indicators **14**

Conception of Patent, Patentable Inventions, Process of obtaining a Patent: application, examination, opposition and sealing of patents; Rights and obligations of a Patentee, International Patents, Transfer of technology, know-how and problems of self-reliant development. Basic provisions related to Designs, Geographical Indicators.

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

- understand the role of patent in innovation and Process of obtaining a Patent (L1)
- acquire knowledge about basic provisions related to Designs and Geographical Indicators (L2)

Unit 5 International Instruments Concerning intellectual Property Rights 10

The Berne Convention, Universal Copyright Convention, The Paris Union, The World Intellectual Property Rights Organization (WIPO), UNESCO, TRIPS, TRIMS, and WTO.

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

- become familiar with international instruments concerning intellectual property (L2)
- Able to understand role of The World Intellectual Property Rights Organization (WIPO) and WTO in promoting IPRs(L2)

Prescribed Textbooks:

1. Intellectual Property Rights: Basic Concepts, MMS Karki, Atlantic, 2009.
2. Intellectual Property Rights, Pandey, Neeraj, Dharani, Khushdeep.

Reference Books:

1. Intellectual Property Rights in India: General Isuues and Implications, Dr. Prankrishna Pal, Regal Series.
2. Intellectual Property, W.R. Cornish, Sweet & Maxwell, London, 2012.
3. Principles of Intellectual Property, N.S. Gopala krishnan & T.G. Agitha, Eastern Book Company, Lucknow, 2009.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Gain awareness about Intellectual Property Rights (IPRs).	L2
2. Acquire adequate knowledge in the kinds of Intellectual Property Rights (IPRs).	L1
3. learn the process of patent filing and registration in India	L3
4. Learn the basic concepts of relating to copy rights, trademarks, geographical indications and others Intellectual properties.	L2
5. Gain more insights into the regulatory aspects of Intellectual Property Rights (IPRs). in India	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AE5B.1	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-
20AE5BT.2	2	-	2	-	2	-	2	-	2		-	1	-	-	-
20AE5BT.3	-	2	-	-	-	2	1	3	-	2	1	-	-	-	-
20AE5BT.4	1	-	2	-	-	-	-	1	-	-	-	-	-	-	-
20AE5BT.5	-	1	-	2	-	-	-	2	-	-	2	-	-	-	-

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

Title of the Course	Sustainable Construction Methods
Category	PEC
Course Code	20A15AT
Year	III B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To impart students with the knowledge on various sustainable materials used for construction.

Unit 1 Sustainability **10**

Definition of sustainable (green) building, Need of Green Building, Benefits of Green Buildings, Green Building Materials and Equipment in India, Key Requisites of a Green Building, Important Sustainable features for Green Building,

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

- The importance of sustainable buildings. (L4).
- Various sustainable materials. (L4).

Unit 2 Green Buildings and Practices **10**

Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation; Green Building Opportunities And Benefits: Opportunities of Green Building, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency,

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

- Know about green buildings ratings. (L3).
- Know about the importance of Energy efficiency. (L3)

Unit 3 Green Building Design **10**

Reduction in Energy Demand, Onsite Sources and Sinks, Maximize System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources. Ecofriendly captive power generation for factory, Building requirement.

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

- Learn sources and sinks and maximizing the efficiency of systems. (L4)
- Design of green buildings(L4)

Unit 4 Heat Ventilation and Air Conditioning systems **8**

CII Godrej Green business center, Design philosophy, Design interventions, Energy modeling, HVAC System design, Chiller selection, pump selection, Selection of cooling towers, Selection of air handing units, Precooling of fresh air, Interior lighting system, Key feature of the building. Eco-friendly captive power generation for factory, Building requirement. Use of Geothermal Energy for Cooling and heating structures.

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

- Understand and apply Heat ventilation in residential and commercial establishments. (L4)
- Understand the orientation of natural ventilation (L2).

Unit 5 Material Conservation and Handling of Non Process waste. **12**

waste reduction during construction, materials with recycled content, local materials, material reuse, certified wood, Rapidly renewable building materials and furniture; Indoor Environment Quality And Occupational Health:

Air conditioning, Indore air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels.

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

- Know various materials and their sustainable sourcing. (L3)
- Understand ambient air quality and measures to improve it. (L3)

Prescribed Text Books:

1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and .Air conditioning Engineers, 2009.
2. Green Building Hand Book by Tomwoolley and Samkimings, 2009.

Reference Books:

1. Complete Guide to Green Buildings by Trish riley.
2. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the Concept of Green Building materials and Sustainable Features	L4
2. Understand the Green Building concepts and practices in India.	L3
3. Reduce Energy Demand and Use Onsite Sources.	L4
4. Design and modeling of air conditioning Interior lighting systems.	L4
5. Understand the material conservation handling of non-process wastes in Green Building.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A15AT.1	-	1	2	-	-	-	3	-	-	-	-	1	-	1	1
20A15AT.2	-	1	1	-	-	-	1	-	-	-	-	1	-	1	-
20A15AT.3	-	1	1	-	-	-	1	-	-	-	-	1	-	1	-
20A15AT.4	-	1	1	-	-	-	1	-	-	-	-	1	-	1	-
20A15AT.5	-	1	1	-	-	-	1	-	-	-	-	1	-	1	-

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

Title of the Course	Advanced Structural Analysis
Category	PEC
Course Code	20A15BT
Year	III B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
- The main objective of this course is to determine indeterminate structures by using various methods.

Unit 1 Arches **10**

Introduction-Three hinged arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature.

Two Hinged Arches: Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, tied arches – fixed arches – (No analytical question).

Learning Outcomes: At the end of the unit, the student will be able to learn
- Analyse Three Hinged and Two hinged arches for different loads. (L4)
- Determine the effects of temperature of supports of arches. (L3)

Unit 2 Slope Deflection Method **10**

Analysis of single bay, single storey, portal frame including side sway.

Moment Distribution Method: Stiffness and carry over factors – Distribution factors – Analysis of single storey portal frames – including Sway

Learning Outcomes: At the end of the unit, the student will be able to
- Draw the bending moment diagrams and shear force diagrams of given frames by using slope deflection equations. (L4)
- Draw the bending moment diagrams and shear force diagrams of given frames by using Moment distribution method. (L4)

Unit 3 Kani's Method. **10**

Analysis of continuous beams – including settlement of supports and single bay, single storey portal frames with side sway.

Approximate Method- Cantilever Method- Portal Method

Learning Outcomes: At the end of the unit, the student will be able to
- Analyse continuous beams with settlement and sway. (L4)
- Draw the bending moment diagrams and shear force diagrams of given frames by kani's method. (L4)

Unit 4 Matrix Methods of Stiffness and Flexibility Analysis **8**

Introduction-application to continuous beams including support settlements.

Stiffness Method: Introduction-application to continuous beams including support settlements.

Learning Outcomes: At the end of the unit, the student will be able to
- Develop stiffness matrices continuous beams. (L4)
- Develop flexibility matrices continuous beams. (L4).
- Draw the bending moment diagrams and shear force diagrams of given structures by flexibility &

stiffness matrix method. (L4)

Unit 5 Plastic Analysis 12

Introduction – Idealized stress – Strain diagram – shape factors for various sections – Moment curvature relationship – ultimate moment – Plastic hinge – lower and upper bound theorems – ultimate strength of fixed and continuous beams.

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

- Perform plastic analysis for various conditions. (L3)
- Analysis the material behavior under plastic analysis(L4)
- Analysis the material take load beyond elastic stages(L4)

Prescribed Text Books:

1. Analysis of Structures – Vol. I & 2 by Bhavikatti, Vikas publications
2. Analysis of structures by Vazrani & Ratwani – Khanna Publications.
3. Strength of Materials and mechanics of solids Vol-2 by B.C. Punmia, Laxmi Publications, New Delhi
4. Comprehensive Structural Analysis-Vol.I&2 by Dr. R. Vaidyanathan & Dr. P.Perumal- Laxmi publications pvt. Ltd., New Delhi
5. Structural Analysis by D.S.Prakasha Rao, Univ.Press, Delhi.Structural Analysis by C.S. Reddy, Tata Macgrawhill, New Delhi.

Reference Books:

1. Structural Analysis (Matrix Approach) by Pundit and Gupta – Tata Mc.Graw Hill publishers.
2. Theory of structures by Ramamuratam, jain book depot, New Delhi.
3. Structural analysis – Hibbler, 6th edition – Pearson publications.
4. Structural analysis by R.S.Khurmi, S.Chand Publications, New Delhi.
5. Analysis Of Structures By Dev Das Menon – John wiley publications

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Determine the normal thrust, radial shear and bending moment in Two hinged and Three hinged arches and also able to draw shear force and bending moment diagrams.	L4
2. Analyze portable frames using Slope deflection and Moment distribution method and also able to draw shear force and bending moment diagrams.	L3
3. Analyze continuous beams and frames using Kani's method and also able to draw shear force and bending moment diagrams.	L4
4. Analyze continuous beams using Matrix method of Structural analysis and also able to draw shear force and bending moment diagrams.	L4
5. Determine shape factors for various sections and also ultimate moment for different beams.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A15BT.1	3	3	-	-	3	-	-	-	-	-	-	-	-	-	-
20A15BT.2	3	3	2	-	3	-	-	-	-	-	-	-	-	-	-
20A15BT.3	3	3	2	2	3	-	-	-	-	-	-	-	-	-	-
20A15BT.4	3	3	2	2	3	-	-	-	-	-	-	-	-	-	-
20A15BT.5	3	3	2	1	3	-	-	-	-	-	-	-	-	-	-

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

Title of the Course	Remote Sensing and GIS
Category	PEC
Course Code	20A15CT
Year	III B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To elaborate students on the importance of remote sensing in civil engineering.
- To make students understand the interdisciplinary nature and the versaality of remote sensing when paired with GIS.

Unit 1 Photogrammetry **10**

Introduction to Photogrammetry: Principle and types of aerial photographs, stereoscopy, Map Vs Mosaic, ground control, Parallax measurements for height, determinations

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

- The procedure of photogrammetry and various principles involved in it. (L4)
- The procedure to determine the height of an object from photographs. (L2)

Unit 2 Remote Sensing **10**

Remote Sensing – I: Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units.

Remote Sensing – II: Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis

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

- Learn the basic concepts of remote sensing and the electromagnetic spectrum. (L2)
- Learn the various components and their effects involved in remote sensing. (L3)

Unit 3 GIS **10**

Geographic Information System: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

Types of data representation: Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

Demonstration of GPS- practical appliations.

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

- Learn the geographical information systems and framework of GIS. (L2)
- Different types of data, the process of digitizing and file management. (L4)

Unit 4 Spatial Analysis **8**

GIS Spatial Analysis: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

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

- Learn spatial analysis using GIS. (L3)
- Learn the integrated analysis. (L2)

Unit 5 Applications of GIS 12

Water Resources Applications-I: Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics. Water Resources Applications – II: Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

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

- Learn application of GIS in various fields. (L4)
- Learn application of Water Resources. (L2)

Prescribed Text Books:

1. Thomas. M. Lillesand and Ralph. W. Kiefer, Remote Sensing and Image Interpretation, John Wiley and Sons, 2003.
2. Remote Sensing and GIS, Bhattacharya. B (2008), Oxford University Press,
3. Principals of Geo graphical Information Systems – Peter A Burragh and RachaelMc Donnell, Oxford Publishers 2004.

Reference Books:

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Young, Prentice Hall (India) Publications.
2. Remote Sensing and Geographical Information systems by M.Anji Reddy JNTU KAKINADA 2001, B.S.Publications.
3. GIS by Chang , TMH Publications & Co.,
4. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications

Course Outcomes:

At the end of the course, Students will able to	Blooms Level of Learning
1. Understand the principles and components of photogrammetric and remote sensing.	L2
2. Understand the Procedures of data acquisition of satellite images and their characteristics.	L2
3. Understand the Raster and vector data and modeling of GIS.	L2
4. Understand the GIS methods and data storage related to the topography of earth surface.	L2
5. Understand the GIS application to water resources.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A15CT.1	1	1	-	1	-	-	-	2	1	-	1	-	-	-	-
20A15CT.2	2	-	1	1	2	-	-	1	1	2	1	1	-	-	-
20A15CT.3	-	2	-	1	-	-	-	1	1	-	1	1	-	-	-
20A15CT.4	-	-	-	-	-	-	-	1	1	1	1	-	-	-	-
20A15CT.5	3	-	-	1	-	-	-	1	1	2	1	1	-	-	-

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

Title of the Course	Urban Transportation and Planning
Category	PEC
Course Code	20A15DT
Year	III B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To introduce the student to the basic concepts of urban transportation planning
- To introduce the student various stages of planning such as trip generation, trip distribution, mode split and traffic assignment are dealt here.
- Concepts of economic evaluation of transportation plans

Unit 1 Concept of Travel Demand 10

Concept of Travel Demand; Travel Characteristics - Origin, Destination, Route, Mode, Purpose; Travel Demand as a function of independent variables; Assumptions in Demand Estimation Relation between land use and Travel.

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

- The procedure of concept Travel Characteristics. (L2)
- The procedure to know estimation relation between land use and Travel. (L1)

Unit 2 Transportation planning process 10

Transportation Planning process; General concept of Trip; Four step process of Transportation planning-Aggregate and disaggregate Models. Delineation of study area; Zoning Principles; Formation of TAZs; Types and sources of Data, Home Interview surveys; Road side interview surveys; Goods. Taxi, IPT surveys; sampling techniques; Expansion factors and accuracy check; Desire line diagram and use.

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

- The procedure of concept planning process. (L4)
- The procedure to surveys (L5)

Unit 3 Trip Generation &Trip Distribution 10

Trip Generation: Factors governing Trip Generation and Attraction; Multiple Linear Regression Models, Category Analysis.

Trip Distribution: Methods of Trip Distribution; Growth Factor Models Uniform Growth Factor Method; Average Growth Factor Method; Fratar Method; Advantages and limitations of Growth Factor Models; concept of Gravity Model(Elementary Concept Only).

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

- To know the concept of trip generation. (L2)
- to understand models about trip distribution (L1).

Unit 4 Mode Split 10

Mode Split: Factors affecting mode split; Logit Model.

Traffic assignment: Purpose of Assignment and General Principles; Minimum path trees; Assignment Techniques - All - or- nothing Assignment; Capacity restraint Assignment; diversion curves.

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

- To know the concept of mode spit. (L2)
- To understand purposes of Traffic assignment. (L1)

Unit 5 Economic Evaluation of Transportation plans 10

Costs and benefits of transportation projects; vehicle operating cost; Time savings; Accident costs. Methods of Economic Evaluation - Benefit cost Ratio Method; Net present value method; Internal Rate of Return method.

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

- To know the concept of transportation projects. (L1)
- To understand purposes of economic valuation. (L5)

Prescribed Text Books:

1. Traffic Engineering and Transporation Planning by L.R.Kadiyali, Khanna Publishers,Delhi.
2. Fundamentals of Transportation Engineering by Papa Costas C.S., Prentice Hall, India.
3. Transportation Engineering -An Introduction by Khisty C.J, PrenticeHall.

Reference Books:

1. Transportation Planning: Principles, Practices And Policies" By Pradeep Kumar Sarkar And Vinay Maitri
2. "Transportation Engineering And Planning" By Papacostas
3. "Transportation Planning" By Prabir Kumar Sarkar And Vinay Maitri

Course Outcomes:

At the end of the course student will be able to	Blooms Level of Learning
1. Understand the route maps of origin and destination of travel demand..	L2
2. Supervise the process of data collection about travel behavior and analyze the data for use in transport planning.	L4
3. Develop and calibrate model split, trip generation rates for specific types of land use developments.	L5
4. Estimate the traffic flow on network	L3
5. Design, conduct and administer surveys to provide the data required for transportation planning for economic evaluation.	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A15DT.1	-	-	3	-	-	-	-	-	-	-	-	2	2	-	-
20A15DT.2	-	-	3	-	-	-	-	-	-	-	-	2	2	-	-
20A15DT.3	-	-	3	-	-	-	-	-	-	-	-	2	2	-	-
20A15DT.4	-	-	3	-	-	-	-	-	-	-	-	2	2	-	-
20A15DT.5	-	-	3	-	-	-	-	-	-	-	-	2	2	-	-

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

Title of the Course Environmental Engineering Lab
Category PCC
Course Code 20A152L

Year III B. Tech.
Semester I Semester
Branch CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To enable students to perform analysis on fresh and waste water, to determine its suitability for various anthropological activities.

List of Experiments **40**

1. Determination of Acidity and Alkalinity
2. Determination of Chlorides
3. Determination of Dissolved Oxygen
4. Estimation of Sulphates
5. Determination of pH and Estimation of Conductivity
6. Determination of Turbidity
7. Estimation of Hardness of water by EDTA Titration Method
8. Determination of Available Chlorine in Bleaching Powder, Residual Chlorine, Break Point Chlorination and Chlorine Demand.
9. Optimum Coagulant Dose by Jar Test Apparatus
10. Determination of Total solids, settle-able solids, dissolved solids and volatile Solids.
11. Determination of DO and aspects of BOD, COD and MPN(Most Probable Number)
12. Determination of Ammonia–nitrogen and Nitrates.
13. Estimation of Phosphates.

Course Outcomes:

At the end of the course student will be able to	Blooms Level of Learning
1. Determine the pH and Conductivity.	L3
2. Determine the Available Chlorine in Bleaching Powder, Residual Chlorine, Break Point Chlorination and Chlorine Demand.	L3
3. Determine Total solids, settle-able solids, dissolved solids and volatile Solids.	L3
4. Determine DO and aspects of BOD, COD and MPN.	L3
5. Determine Ammonia-nitrogen and Nitrates and also can estimate the phosphates	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A152L.1	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
20A152L.2	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
20A152L.3	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
20A152L.4	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
20A152L.5	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-

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

Title of the Course	Structural Analysis & Design Lab (STAAD Pro)
Category	PCC
Course Code	20A154L
Year	III B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To enable students with the knowledge of structural analysis and design using STAAD PRO or Equivalent Software.

List of Experiments **40**

1. Introduction to STAAD Pro.
2. Analysis of a Continuous beam with different loading conditions
3. Analysis and design of multi bay, multi-storey 2D frame
4. Analysis and design of multistory building
5. Wind analysis on RCC building
6. Analysis and design of steel tubular truss
7. Analysis and design of One-Way slab
8. Analysis and design of Two-Way slab
9. Analysis and design of Transmission tower
10. Analysis and design of Retaining wall
11. Analysis of Bridge deck

Course Outcomes:

At the end of the course student will be able to	Blooms Level of Learning
1. Select the appropriate Structural system for conventional reinforced concrete Structures.	L2
2. Determine the preliminary designs of structures assuming preliminary dimensions.	L4
3. Apply the fundaments of reinforced concrete to design structures like retaining walls, water tanks, staircase, and other structures of importance.	L3
4. Analyze and design simple towers	L4
5. Analyze and design one way and two way slabs.	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A154L.1	1	3	3	-	3	-	-	3	3	3	-	3	-	-	-
20A154L.2	-	3	3	2	3	1	1	1	3	-	1	3	-	-	-
20A154L.3	-	2	3	-	3	1	1	2	-	2	1	3	-	-	-
20A154L.4	3	3	3	3	-	-	-	-	-	-	-	3	-	-	-
20A154L.5	3	3	3	3	-	-	-	-	-	-	-	3	-	-	-

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

Title of the Course	Essence of Indian Traditional Knowledge
Category	MC
Course Code	20AC53T
Year	III B. Tech.
Semester	I Semester
Branch	CSE, CE, AIDS & AIML

Lecture Hours	Tutorial Hours	Practical	Credits
2	0	0	0

Course Objectives:

- To learn basic principles of thought process, reasoning and inference. Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature.
- To understand Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature in modern society with rapid technological advancements and societal disruptions.
- To understand Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system.
- To understand Indian philosophical traditions, Indian linguistic Tradition, and Indian artistic tradition.

Unit 1 **10**

Indian Tradition: Fundamental unity of India, India's heroic role in world civilization, The Indian way of life, Introduction to Indian tradition, The Scientific Outlook and Human Values.

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

- Appreciate incorporated traditions in Indian culture
- Understand the value of culture and traditions in leading peaceful life
- Understand the hidden scientific outlook and imbibed human values in the Indian way of life

Unit 2 **10**

Basic structure of Indian Knowledge System: Indian Traditional Scriptures, Exposure to 4-Vedas (the Rigveda, the Yajurveda, the Samaveda and the Atharvaveda) , 4-Upvedas (Ayurveda, Dhanurveda, Gandharvaveda, Sthapatya etc.), 6-Vedangas (Shiksha, Kalp, Nirukta, Vyakaran, Jyotish), 6-Upangas (Dharmashastra, Meemansa, Puranas, Tarkashastra/Logic) etc.

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

- Grasp basic structure of Indian knowledge system
- Understand the essence of Vedas and their value
- Understand the systematic classification of holy scriptures

Unit 3 **10**

Indian Knowledge System and Modern Science: Relevance of Science and Spirituality, Science and Technology in Ancient India, Superior intelligence of Indian sages and scientists.

Indian Traditional Health Care: Importance and Practice of Yoga, Pranayama and other prevailing health care techniques.

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

- Establish connection between Indian knowledge system and Modern science
- Understand spirituality in relation to science
- Appreciate the superior intelligence of Indian saints and scientists

Unit 4 **8**

Indian Artistic Tradition: Introduction and overview of significant art forms in ancient India such as painting, sculpture, Civil Engineering, Architecture, Music, Dance, Literature etc.

Indian Linguistic Tradition: Ancient Indian languages and literary Heritages, Phonology, Morphology, Syntax and Semantics.

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

- Get an overview of significant art forms of ancient India
- Understand pioneering efforts of ancient civil engineering technology
- Trace the basic Indian linguistic tradition

Unit 5 **10**

Indian Philosophical Tradition: (Sarvadarshan)- Nyaya, Viaisheshiika, Sankhya, Yoga, Meemansa, Brief understanding of Philosophy of Charvaka, Bhagwan Mahaveer Jain, Bhagwan Buddha, Kabeer, Guru Nanak Dev and other eminent ancient Indian Philosophers.

Activities: Activities will consist of one assignment on each module, group discussions, presentations, case study on various topics based on above curriculum

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

- Find the essence of Indian philosophical tradition
- Assimilate the philosophical speculations of different sects and the preachings of eminent philosophers of ancient days

Prescribed Text Books

1. Ajwani L.H., Immortal India, Vora & Co. Publishers, 1997.
2. Swami Jitmananda, Modern Physics and Vedanta, Bharatiya Vidya Bhavan, 2004.
3. Krishnamurthy,V. Science and Spirituality- A Vedanta Perception, Bharatiya Vidya Bhavan, 2002.
4. Sharma D.S., The Upanishads- An Anthology, Bharatiya Vidya Bhavan, 1989.
5. Raman V.V., Glimpses of Indian Heritage, Popular Prakashan, 1993.

Reference Books:

1. Sivaramakrishnan, V., Cultural Heritage of India- Course Material, Bharatiya Vidya Bhavan, Mumbai, 5 th Edition, 2014.
2. Capra F., Tao of Physics, Shambhala, 2010.
3. Chaterjee S.C. and Datta D.M., An Introduction to Indian Philosophy, University of Calcutta, 1984.
4. Krishna Chaitanya, Arts of India, Abhinav Publications, 1987.
5. Jha V.N., Language, Thought and Reality.

Course Outcomes:

Upon successful completion of the course, student will be able to	Bloom's Level of Learning
1. Explain basics of Indian tradition and Indian traditional knowledge systems.	L3
2. Describe basics of Indian traditional health care, technologies and its scientific perspectives.	L3
3. Explain basics of Indian artistic, linguistic and philosophical tradition.	L3
4. Co-relate the Indian traditional knowledge in modern scientific perspective.	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC53T.1	-	-	-	-	-	-	-	-	-	-	-	3
20AC53T.2	-	-	-	-	-	-	-	-	-	-	-	3
20AC53T.3	-	-	-	-	-	-	-	-	-	-	-	3
20AC53T.4	-	-	-	-	-	-	-	-	-	-	-	3

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

Title of the Course JAVA Programming
Category SC
Course Code 20A555L

Year III B. Tech.
Semester I Semester
Branch CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives: This course will be able to
- Understand the basic concepts of java programming.
- Analyze and apply concepts like packages, interfaces, and exception handling.
- Implement the multi-threading and GUI applications developed using JAVA.

Module 1 **Theory Hours: 4, Practice sessions: 6**
What is Java? Install Java & Java IDE, First Java Program, Variables and Data Types in Java, Operators in Java, Flow Control Statements in Java, functions in java, arrays in java, Strings in java
Learning Outcomes: At the end of the unit, the student will be able to
- Understand the data types, operators and control statements in Java (L2)
- Know the importance of functions, arrays and strings in Java Programming (L2)

Module 2 **Theory Hours: 3, Practice sessions: 6**
Object-Oriented Programming, Classes and Objects, Encapsulation, Abstraction, Inheritance, polymorphism
Learning Outcomes At the end of the unit, the student will be able to:
- Demonstrate the importance of object oriented programming (L3)
- Define object oriented concepts (L2)

Module 3 **Theory Hours: 3, Practice sessions: 6**
Packages and Interfaces: Packages, Defining a Package, A Short Package Example, Access Protection, an Access Example, Importing Packages.
Abstract keyword, Interfaces: Defining an Interface, Implementing Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces, Interfaces Can Be Extended
Learning Outcomes At the end of the unit, the student will be able to:
- Apply packages in the java programs (L3)
- Differentiate abstract class and interfaces (L3)

Module 4 **Theory Hours: 4, Practice sessions: 8**
Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Displaying a Description of an Exception, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Built-in Exceptions
Multithreaded Programming: The Java Thread Model, Thread Priorities, Synchronization, Messaging, The Thread Class and the Runnable Interface, The Main Thread, Creating a Thread, Implementing Runnable, Extending Thread, Choosing an Approach, Creating Multiple Threads
Learning Outcomes At the end of the unit, the student will be able to:
- Acquire knowledge on multithreading, exception handling and apply the same in developing real time java based applications (L1)
- Construct and classify error and exception handling (L4)

Module 5 **Theory Hours: 3, Practice sessions: 6**
Generics: What Are Generics, Generics Work Only with Reference Types, A Generic Class with Two Type

Parameters, The General Form of a Generic Class
JavaFX Basic Concepts, Using Image and Image View, Button, Radio Button, CheckBox, TextField
Learning Outcomes At the end of the unit, the student will be able to:

- Articulate the generics in java programming (L3)
- Implement JavaFX Basic Concepts in java programs (L5)

Prescribed Text Books:
1. Herbert Schildt.Java. The complete reference, TMH, 9th Edition.

Reference Books:
1. J.Nino and F.A. Hosch, An Introduction to programming and OO design using Java, John Wiley & sons.
2. Y. Daniel Liang, Introduction to Java programming, Pearson Education. 6th Edition
3. R.A. Johnson- Thomson, An introduction to Java programming and object oriented application development,

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the importance of datatypes, operators, functions, arrays and strings in Java Programming.	L2
2. apply reusability concepts like Inheritance, interfaces and packages in real time applications developed using JAVA	L3
3. relate the abstract class and interfaces in java programming	L3
4. Construct and classify error and exception handling	L4
5. Implement genetics and JavaFX basic concepts in java programs.	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20A555L.1	3	3	-	-	-	-	-	-	-	-	-	-
20A555L.2	-	3	3	2	-	-	-	-	-	-	-	-
20A555L.3	3	3	3	2	-	-	-	-	-	-	3	3
20A555L.4	3	3	3	-	-	-	-	-	-	-	3	3
20A555L.5	3	3	3	-	-	-	-	-	-	-	3	3

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

Title of the Course	Transportation Engineering
Category	PCC
Course Code	20A161T
Year	III B. Tech.
Semester	II Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To familiarize student about the history and classification of roads.
- To study about the geometric design of highways and traffic characteristics.
- To familiarize students with the design of intersections.
- To know about the design of pavements.

Unit 1 Highway Development and Planning 10

Importance of transportation, different modes of transportation, characteristics of road transport, scope of highway and traffic engineering -Classification of roads, road development in India, Road projects in India; highway alignment -Factors affecting Alignment and project preparation. Road network Patterns - Engineering Surveys – Drawings and Reports.

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

- The process and characteristics of different road patterns and basics of pavements. (L1)
- To apply which survey could be fitting to be used in a specific type of road survey. (L2)

Unit 2 Geometric Design of Highways 10

Highway cross section elements; sight distance, design of horizontal alignment; design of vertical alignment; Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves- Design of Vertical alignment - Gradients, Vertical curves. Problems.

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

- Understand various design elements in highways.(L4)
- Apply the concept of sight distances in daily life.(L5)

Unit 3 Traffic Engineering 12

Traffic engineering & control- Traffic Characteristics, - Traffic studies - speed, volume, speed and delay, origin destination, parking and accident studies- traffic engineering studies, Road Accidents-Causes and Preventive measures, Accident Data Recording – Condition Diagram and Collision Diagram, Problems

Intersection Design: Types of Intersections –Types of Grade Intersections- Channelization: Objectives –Traffic Islands and Design criteria-Types of Grade Separated Intersections- Rotary Intersection –Concept of Rotary and Design Criteria.

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

- Understand and apply traffic, accidents and design of traffic intersections.(L1)
- Design different traffic intersections and rotary intersections.(L4)

Unit 4 Pavement Materials and Mix Design 10

Pavement Materials Aggregates- Origin, Classification, Requirements, properties and tests on Road aggregates Soils, Stone, bituminous binders, bituminous paving mixes; Portland cement and cement concrete, Origin, Bitumen and Tar- Preparation, Properties and Chemical Constitution of bituminous road binders, Requirements.

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

- Differentiate between different pavement materials and their importance and uses.(L2)

- Know about different binders for pavements .(L2)

Unit 5 Pavement Design 12

Design of pavements- Introduction; flexible pavements, factors affecting design and performance; stresses in flexible pavements; design of flexible pavements as per IRC; rigid pavement components and functions; factors affecting design and performance of CC pavements; stresses in rigid pavements; design of concrete pavements as per IRC; problems.

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

- Design different pavements as per requirement.(L4)
- Analyses different problems associated with different pavements.(L5)

Prescribed Text Books:

1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7thedition, (2000).
2. Highway Engineering Design – L.R.Kadiyali and Lal- Khanna Publications.
3. A Text book of Transportation Engineering by S.P.Chandola, S.Chand Publications, New Delhi.

Reference Books:

1. Highway Engineering – S.P.Bindra ,DhanpatRai& Sons. – 4th Edition (1981)
2. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna publications – 6th Edition – 1997.
3. Introduction to Transportation Engineering by James.H.Banks, TataMc.Grawhill Edition, New Delhi.
4. Traffic and Highway Engineering Nicholas.J.Garber&LesterA.Hoel
5. High way engineering by Paul .H.Wright& Karen K.Dixon,wileyindia limited.

Course Outcomes:

At the end of the course, the student will be able	Blooms Level of Learning
1. Understand and plan highway networks, carry out surveys involved in planning and highway geometrics.	L2.
2. Choose proper design Geometric, horizontal and vertical curves for highways	L3
3. Understand and apply various traffic management plans	L2,L3
4. Understand the characteristics of various pavement materials	L2
5. Analyze and design flexible and rigid pavements	L4, L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A161T.1	3	-	-	-	-	2	-	-	-	3	-	-	-	-	-
20A161T.2	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
20A161T.3	-	3	2	-	-	1	-	2	-	2	-	3	-	-	-
20A161T.4	-	2	2	-	-	-	-	-	2	-	-	-	-	-	-
20A161T.5	-	-	2	-	-	1	-	-	1	3	-	3	-	-	-

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

Title of the Course	Engineering Estimation, Costing and Valuation
Category	PCC
Course Code	20A162T
Year	III B. Tech.
Semester	II Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- The objective of the course is to make the student to understand about estimation of quantities and valuations of different types of structures as per standard schedule of rates.

Unit 1 Introduction to Estimation and Standards Specification 10

Introduction: General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.

Standards Specifications: Standard specifications for different items of building construction.

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

- Different items involved in a building and their standard units of measurement. (L4)
- The standard specification of different works. (L3)

Unit 2 Estimation of Buildings 10

Estimation Of Buildings: Detailed Estimates of Buildings- Different items of works in building – Principles of taking out quantities – Detailed measurement form – Estimate of RCC building - Long wall - Short wall method and Centre line method – Various types of arches – Calculation of brick work and RCC works in arches. Cost Estimation of Mechanical and Electrical items.

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

- Estimate various quantities of work done using different methods. (L3)
- Understand the cost calculations of different works.(L2)

Unit 3 Earthwork Estimation 10

Earthwork for roads and canals.

Roads: Estimate of bituminous and cement concrete - Estimate of earthwork - Estimate of pitching of slopes - Estimate of earthwork of road from longitudinal sections - Estimate of earthwork in hill roads.

Canals: Earthwork in canals – Different cases – Estimate of earthwork in irrigation channels.

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

- Estimate the earthwork required for roads. (L4)
- Estimate the earthwork required for canals. (L4)

Unit 4 Contracts and Tenders 10

Contracts And Tenders: Contracts – Types of contracts – Contract Documents– Conditions of contract – Types of Tenders – Requirement of Tendering.

Valuation: Valuation of buildings. Necessity - Different terms used in valuation and their meaning - Different methods of building valuation and rent fixation - Outgoings – Depreciation - Methods for estimating cost depreciation – Escalation.

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

- Differentiate between contracts and tenders (L4)
- Valuate structures using different methods taking depreciation into consideration. (L4)

Unit 5 Rate Analysis **10**

Working out data for various items of work over head and contingent charges - Task or out – Turn work – Labor and materials required for different works - Rates of materials and labor - Schedule of Rates - Preparing analysis of rates for the following items of work: Concrete, RCC Works, Brick work in foundation and super structure, plastering, CC flooring, whitewashing.

Reinforcement Estimation: Reinforcement bar bending and bar requirement schedules.

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

- Prepare rate analysis for various works. (L3)
- Estimate the required reinforcement and give schedules for bar bending. (L3)

Prescribed Text Books:

1. Estimating and Costing, 27th revised edition by B.N. Dutta, UBS publishers, 2000.
2. Civil Engineering Contracts and Estimations, 4th edition by B.S.Patil, Universities Press, Hyderabad.

Reference Books:

1. Engineering Construction Cost 6th edition by Peurifoy, TMH Publications
2. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.
3. Standard Schedule of Rates and Standard Data Book by Public WorksDepartment.
4. IS:1200 (Parts I to XXV – 1974/ Method of Measurement of Building and Civil Engineering works B.I.S.)
5. National Building Code

Note: *Standard schedule of rates is permitted in the examination hall.*

Course Outcomes:

At the end of the course, the student will be able	Blooms Level of Learning
1. To understand the importance of preparing the types standard specifications for different items of building construction.	L2
2. To prepare quantity estimates for estimates of buildings roads and canals.	L3,L4
3. To prepare quantity estimates for estimates of buildings roads and canals	L4
4. To understand various contracts and tenders in construction practices.	L2
5. To apply logical thoughts and prepare the rate analysis for different works.	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A162T.1	-	-	1	2	-	-	-	-	3	-	-	-	-	-	-
20A162T.2	1	2	-	-	-	-	-	-	-	-	-	3	-	-	-
20A162T.3	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-
20A162T.4	-	-	-	1	-	-	-	-	-	2	-	3	-	-	-
20A162T.5	-	1	2	3	-	-	-	-	3	4	-	-	-	-	-

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

Title of the Course	Soil Mechanics
Category	PCC
Course Code	20A163T
Year	III B. Tech.
Semester	II Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To impart knowledge to classify the soil based on index properties and to assess their engineering properties based on the classification.
- To familiarize the students about the fundamental concepts of flow through soil
- To familiarize the students about the fundamental concepts of stress transformation, stress distribution
- To familiarize the students about the fundamental concepts of compaction and consolidation
- To familiarize the students about the fundamental concepts of shear strength of soils.

Unit 1 Soil Formation and Index Properties 12

Definition, origin and formation of soil, List of different soil types, Definition of mass, weight- Relation between mass and weight- Units of mass and weight in SI units-Phase Diagram, Voids ratio, Porosity, Percentage Air Voids, Air content, Degree of saturation, Moisture content, Specific gravity, Bulk density, Dry density, Saturated density, Submerged density and their interrelationships -clay mineralogy and soil structure.

Index Properties Of Soils And Their Determination: Index Properties of soils and their significance. Various index properties and their Laboratory determination, -Water content, Specific Gravity, Particle size distribution (Sieve analysis and Hydrometer analysis), Relative density, Consistency limits and their indices, in-situ density, Activity of Clay, Thixotropy of clay, IS classification - Plasticity chart and its importance.

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

- Classify the soils based on index properties (L3)

Unit 2 Permeability 10

Permeability: Types of soil water – capillary rise – flow of water through soils – Darcy's law- permeability – Factors affecting permeability – laboratory determination of coefficient of permeability –Permeability of layered systems.

Seepage Through Soils: seepage velocity, Seepage pressure, seepage through soils- total, neutral and effective stresses – quick sand condition — flow nets: characteristics and uses, numerical problems.

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

- Calculate permeability of the soil (L3)
- Know the seepage loss through the soil (L3)

Unit 3 Stress Distribution In Soils 8

Importance of estimation of stresses in soils – Boussinesq's and westergaard's theories for point loads, stress distribution in different loaded areas-line load, uniformly loaded circular, strip footing, pressure bulb, variation of vertical stress under point load along the vertical and horizontal planes – Newmark's influence chart.

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

- Estimate the stress in the soil for different types of soils (L4)

Unit 4 Compaction and Consolidation 8

Compaction: Mechanism of compaction – factors affecting – effects of compaction on soil properties – Field compaction Equipment – compaction control

Consolidation: Types of compressibility – Immediate settlement – Primary consolidation and secondary consolidation – Stress history of clay, normally consolidated soil, over consolidated soil and under consolidated soil- pre-consolidation pressure and its determination- Estimation of settlements -Terzaghi's 1-D consolidation theory – Coefficient of consolidation and its determination.

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

- Understand the compaction of soil (L4)
- Estimate the settlement of the soil due to consolidation (L4)

Unit 5 Shear Strength of Soils 10

Definition and use of shear strength - Source of shear strength- Normal and Shear stresses on a plane – Mohr's stress circle- Mohr-Coulomb failure theory- Measurement of shear strength, Drainage conditions -Direct shear test, Tri-axial shear test, Unconfined compression test and vane shear test – shear strength of granular soil, shear strength of clay, Factors affecting shear strength of granular soils and clay, Liquefaction.

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

- Draw Mohr circle (L3)
- Calculate the shear parameters from the tests (L2)

Prescribed Text Books:

1. Basic and Applied Soil Mechanics by Gopal Ranjan& ASR Rao, New age International Pvt . Ltd, New Delhi
2. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
3. Geotechnical Engineering V.N.S.Murthy, CRC Press, Newyork, Special Indian Edition.

Reference Books:

1. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).
2. Soil Mechanics – T.W. Lambe and Whitman, Mc-Graw Hill Publishing Company, Newyork
3. Geotechnical Engineering by Brije.M.Das, Cengage Publications, New Delhi.
4. Geotechnical Engineering by Purushotham Raj
5.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the Index properties of soils such as phase relationships, unit weight, water content, grain size distribution, index properties, methods of soil classifications and compaction characteristics in soils and classify the soils..	L2,L3
2. Understand the concepts of total, neutral and effective stress in soils, principle Darcy's law, permeability and seepage in soils and their effects in enginee applications.	L3
3. Understand the concepts of stress distribution under varying load conditions and the application of Boussinesq's and Westergaard's theories for finding stress distribution in soils.	L2,L3
4. Understand the Terzaghi's theory of primary consolidation, settlement in soils and associated properties.	L2
5. Understand the shear stress and shear strength properties in soils, Mohr diagrams, shear strength tests.	L2

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A163T.1	3	1	-	-	-	-	-	-	1	-	-	-	-	-	-
20A163T.2	3	3	-	2	-	-	-	-	-	-	-	2	-	-	-
20A163T.3	3	1	-	3	2	-	-	-	1	-	2	3	-	-	-
20A163T.4	2	3	-	3	2	-	-	-	-	-	2	2	-	-	-
20A163T.5	3	2	-	2	2	-	1	-	-	-	2	3	-	-	-

ANNAMCAHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Civil Engineering

Title of the Course	Design of Steel Structures
Category	PEC
Course Code	20A16AT
Year	III B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To familiarize students with different steel sections and methods of joining them for structural use.
- To enable students to design columns and beams of various combinations to withstand the loads imposed.

Unit 1 Structural Steel and Welding. 10

Properties of structural steel, rolled steel sections as per IS specifications, factor of safety.
Working stress Method and Limit state Method: Design of connections: riveted, welded and bolted connections, Design of fillet and butt weld, Eccentric connections and Efficiency of joints
Learning Outcomes: At the end of the unit, the student will be able to learn

- Different types of steel sections and IS specifications involved. (L4)
- Analyse and Design of various welds and bolt connections. (L3)

Unit 2 Design of Tension and Compression Member 10

Design of Tension Member:
Net Sectional Area, Permissible Stress, Design of Axially Loaded Tension Member.
Design of Compression Member:
Column: Euler's Theory, Effective Length, Slenderness Ratio. Design of Compression Members, Design of Built-Up Compression Members: Laced and Battened Columns

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

- Design and analyze various sectional Areas, Permissible Stresses and Axially Loaded Tension Member. (L4)
- Design and analyze various sections subjected to Compression Members. (L3)

Unit 3 Design of Column Bases and Grillage foundation 10

Design of slab base and gusset base and grillage foundation (introduction) along with its connection with column
Learning Outcomes: At the end of the unit, the student will be able to learn

- Design Slab base and gusset plate. (L4)
- Design Grillage Foundation along with its connections (L4)

Unit 4 Design of Beams 8

Introduction, beam type, section classification, lateral stability of beam, lateral torsional buckling of symmetrical section, design strength of beam (Laterally

supported and unsupported), shear strength and deflection, web buckling and web crippling.

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

- Design beams for lateral stability and lateral torsional buckling of symmetrical sections. (L3)
- Design laterally supported and laterally unsupported beams. (L3)

Unit 5 Design of Girders 12

GANTRY GIRDER:

Gantry girder impact factors – longitudinal forces, Design of Gantry girders.

PLATE GIRDER:

Design consideration – I S Code recommendations Design of plate girder-Welded – Curtailment of flange plates stiffeners.

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

- Design of plate girder (L3)
- Design of gantry girder (L3)

Prescribed Text Books:

1. Design of Steel Structures by N. Subramanian, Oxford Publication.
2. Design of Steel Structures by Arya and Ajmani, Nem Chand Brothers Roorkee.
3. Ramachandra, Design of Steel structures, Vol. I & Vol. II, Standard Publishers Distributors,

Reference Books:

1. Design of steel structures, Duggal, 3E, Tata Mc Graw Hill.
2. Design of steel structures by Limit state method, S S Bhavikatti, 2009, I K International Publishing House.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand different types of steel connections and the design philosophies and behavior of structural steel	L2
2. Understand the importance and design of tension	L3
3. Understand the importance and design compression members.	L3
4. Understand the necessity and design of built up members and column foundations	L2
5. Understand the loads acting on the beam, design of different types of beams	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17AT.1	3	2	2	-	3	2	-	-	-	-	-	2	-	-	-
20A17AT.2	2	2	3	-	-	2	-	-	2	-	-	-	-	-	-
20A17AT.3	3	1	-	-	-	1	-	-	-	-	-	-	-	-	-
20A17AT.4	3	3	-	-	-	2	-	-	-	-	-	2	-	-	-
20A17AT.5	2	3	-	-	3	3	-	-	3	-	-	-	-	-	-

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

Title of the Course	Construction Project Management
Category	PEC
Course Code	20A16BT
Year	III B. Tech.
Semester	II Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To study and understand the concept of planning, scheduling, cost and quality control.
- To learn the concepts of safety during construction, organization and use of project information necessary for construction project.

Unit 1 Construction Planning **9**

Basic Concepts in the Development of Construction Plans – Choice of Technology and Construction Method – Defining Work Tasks – Defining Precedence Relationships among Activities – Estimating Activity Durations – Estimating Resource Requirements for Work Activities – Coding Systems- Monte Carlo simulations.

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

- Know how to estimate the durations of activities (L2)
- Build the relationship among the activities (L2)

Unit 2 Scheduling Procedures and Techniques **9**

Construction Schedules – Critical Path Method – Scheduling Calculations – Float – Presenting Project Schedules – Scheduling for Activity-on-Node and with Leads, Lags, and Windows – Scheduling with Resource Constraints and Precedences, PERT.

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

- Learn to draw CPM network diagrams (L2)
- Able to find out the floats for the networks (L2)

Unit 3 Advanced Scheduling Techniques **9**

Use of Advanced Scheduling Techniques – Scheduling with Uncertain Durations – Calculations for Monte Carlo Schedule Simulation – Crashing and Time/Cost Tradeoffs – Improving the Scheduling Process

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

- Able to analyse the projects with uncertain durations (L2)
- Able to estimate the project crashing time (L2)

Unit 4 Cost Control, Monitoring and Accounting **9**

The Cost Control Problem – The Project Budget – Forecasting for Activity Cost Control – Financial Accounting Systems and Cost Accounts – Control of Project Cash Flows –Schedule Control – Schedule and Budget Updates – Relating Cost and Schedule Information.

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

- Will have a knowledge of project budget (L2)
- Get ability to control the cost of the project (L2)

Unit 5 Quality Control and Safety in Construction **9**

Quality and Safety Concerns in Construction – Organizing for Quality and Safety – Work and Material Specifications – Total Quality Control – Quality Control by Statistical Methods: Sampling by Attribute and Sampling by Variables – Safety.

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

- Learns to manage quality control of the project (L2)
- Understands the concept of safety during the construction (L2)

Prescribed Text Books:

1. Chitkara, K.K. "Construction Project Management: Planning, Scheduling and Control", McGraw-Hill Publishing Company, New Delhi, 1998.

Reference Books:

1. Calin M. Popescu, Chotchai Charoenngam, "Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications", Wiley, New York, 1995.
2. Chris Hendrickson and Tung Au, "Project Management for Construction – Fundamental Concepts for Owners, Engineers", Architects and Builders, Prentice Hall, Pittsburgh, 2000.
3. Halpin, D. W., "Financial and Cost Concepts for Construction Management", John Wiley & Sons, New York, 1985.
4. Willis, E. M., "Scheduling Construction Projects", John Wiley & Sons, 1986.

Course Outcomes:

At the end of the course the student will be able to,		Blooms Level of Learning
1	Understand about different type of building components and regulations.	L3
2	Understand basic knowledge about the planning of the residential as well as public building and finishing	L3
3	Solve problems related to resource management including Manpower, materials, and machinery.	L2
4	Understand the Forecasting for Activity Cost Control in CPM.	L2
5	Prepare network elements and developments of network diagrams	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A16BT.1	-	-	-	-	-	-	-	-	1	-	1	-	1	-	-
20A16BT.2	-	-	-	-	-	-	-	-	1	1	1	-	1	1	-
20A16BT.3	-	-	-	-	1	-	-	-	1	1	1	-	1	1	-
20A16BT.4	-	-	-	-	1	-	-	-	1	-	1	-	1	1	-
20A16BT.5	-	-	-	-		1	-	-	1	1	-	-	1	-	-

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

Title of the Course	Advanced Environmental Engineering
Category	PEC
Course Code	20A16CT
Year	III B. Tech.
Semester	II Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- The emphasis of the course is on the explanation of water, air and noise pollution
- The course provides the knowledge on effects of pollution to general health.
- This course also provides knowledge on solid waste and hazardous waste management.

Unit 1 Industrial Waste water treatment 10

Industrial Waste water Characteristics; Industrial Waste water treatment techniques Volume reduction; Strength reduction; Neutralization; Equalization and proportioning; Nitrification and Denitrification; Removal of Phosphates; Effluent standards

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

- Design of Industrial wastewater treatment systems for various industries.(L4)
- Effluent standards.(L4)

Unit 2 Air Pollution and Control 10

Sources of pollution – Classification – effects on human beings – Global effects of Air pollution–Air emission standards. Air pollution Control Methods – Particulate control devices – General Methods of Controlling Gaseous Emission.

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

- Different sources and types of air pollutants. (L1)
- Design of different air pollution control systems. (L2)

Unit 3 Solid Waste Management 10

Sources, composition and properties of solid waste –4R's: reduce, reuse, and recycle, recovery –collection and handling – separation and processing. Solid waste disposal methods – Land filling – Incineration – composting.

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

- Sources, composition and properties of solid waste and its derivatives. (L4)
- Design solid waste collection, handling and disposal systems. (L4)

Unit 4 Hazardous Waste Management 8

Hazardous Waste – Nuclear waste – Biomedical wastes – Chemical wastes – Effluent – Disposal and Control methods. Special Wastes/Pollutants of Concern – Plastic waste – e-waste – sources – classification – management – recycling and treatment, adsorption, ion-exchange

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

- Different types of hazardous wastes and their properties. (L4)
- Different techniques of management and disposal. (L4)

Unit 5 Noise Pollution **8**

Effects of noise and control methods – Environmental Audit – ISO – 14000 –Environmental Protection Act –Air Act – Water Act

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

- Different aspects of noise pollution and curtailment measures. (L4)
- Environmental Auditing, ISO ratings, Legislations for environment protection. (L3)

Prescribed Text Books:

1. Introduction to Environmental Engineering by Mines and Lackey–Person Education. 2010.
2. Environmental Engineering and Management – Dr.Suresh, K and Dhaneja S.K. Kartarai & Sons 4th Edition 2010.
3. Environmental Pollution Control Engineering by C.S Rao, 2018.

Reference Books:

1. Physico – Chemical process for water quality control by Weber
2. Air Pollution and Control by M N Rao & H N Rao, 2017, Mc Graw Hill International
3. Frank Kreith, George Tchobanoglous, Handbook of solid waste management, 2002, Mc Graw Hill International.
4. Central Pollution Control Board Guidelines and APSPCB Guidelines on Environmental Management.(http://cpcb.nic.in/) and Andhra Pradesh.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand characteristics of industrial waste water to reduce the threat of water pollution.	L2
2. Understand an overview of air pollution including methods for prevention, Control management of pollution.	L2
3. Plan solid waste minimization and design storage, collection, transport, processing and disposal of municipal solid waste.	L4
4. Understand an overview of hazardous waste including methods for prevention, control and disposal of hazardous waste.	L4
5. Understand an overview of noise pollution including methods for prevention, control of pollution.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A16CT.1	2	2	-	-	-	2	3	-	-	-	-	3	-	-	-
20A16CT.2	2	-	-	-	-	2	3	-	-	-	-	3	-	-	-
20A16CT.3	2	-	-	-	-	-	3	-	-	-	-	2	-	-	-
20A16CT.4	2	3	3	-	-	-	3	-	-	-	-	2	-	-	-
20A16CT.5	2	2	2	-	-	2	3	-	-	-	-	2	-	-	-

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

Title of the Course	Earthquake Resistant Design and Detailing
Category	PEC
Course Code	20A16DT
Year	III B. Tech.
Semester	II Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To introduce the basics of Earth quake Engineering
- To introduce the engineering seismology, Building Geometrics & Characteristics, Structural Irregularities,
- To introduce tips on Earthquake Engineering - do's and don'ts
- To introduce cyclic loading behavior of RC, Steel and Pre-stressed concrete elements
- To discuss code provisions and their application on different types of structures

Unit 1 Introduction to Structural Dynamics 10

Theory of Vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Undamped and damped free vibration – Damping – Response to harmonic excitation – Concept of response spectrum

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

- Describe the Concept of response spectrum (L4)
- Understand the Lumped mass and continuous mass systems (L3)

Unit 2 Multi-Degree of Freedom (MDOF) Systems 10

Formulation of equations of motion – Free vibration – Determination of natural frequencies of vibration and mode shapes – Orthogonal properties of normal modes – Mode superposition method of obtaining response.

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

- Determination of Natural frequencies of vibration and mode shapes (L2)
- Know about Mode superposition method of obtaining response (L2)

Unit 3 Earthquake Analysis 10

Introduction – Rigid base excitation – Formulation of equations of motion for SDOF and MDOF Systems – Earthquake response analysis of single and multi-storied buildings – Use of response spectra-Review of the latest Indian seismic code IS:1893 – 2002 (Part-I) provisions for buildings – Earthquake design philosophy – Assumptions – Design by seismic coefficient and response spectrum methods – Displacements and drift requirements – Provisions fortorsion

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

- Know about Earthquake response analysis of single and multi-storied buildings (L4)
- Design by seismic coefficient and response spectrum methods (L4)

Unit 4 Earthquake Engineering 8

Engineering Seismology – Earthquake phenomenon – Causes and effects of earthquakes – Faults – Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicenter etc

– Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic Zoning Map of India – Seismograms and Accelograms - Review of the latest Indian Seismic codes IS:4326 and IS:13920 provisions for ductile detailing of R.C buildings – Beam, column and joints

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

- Different types of Classification of earthquakes (L4)
- Different Review of the latest Indian Seismic codes (L4)

Unit 5 Seismic Planning 12

A Seismic Planning :- Plan Configurations – Torsion Irregularities – Re-entrant corners Non-parallel systems – Diaphragm Discontinuity – Vertical Discontinuities in load path Irregularity in strength and stiffness – Mass Irregularities – Vertical Geometric Irregularity – Proximity of Adjacent Buildings.

Shear walls: - Types – Design of Shear walls as per IS: 13920 – Detailing of reinforcements.

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

- Different type of shear walls. (L3)
- Know Vertical Discontinuities in load path Irregularity in strength and stiffness (L3)

Prescribed Text Books:

1. Dynamics of Structures – Clough & Penzien, McGraw Hill – International Edition.
2. Earthquake Resistant Design of Structures by S.K.Duggal, Oxford University press, NewDelhi
3. Dynamics of Structures by A.K.Chopra – Pearson Education, Indian Branch, Delhi

Reference Books:

1. Structural Dynamics by Mario Paaz, Academic Publishers.
2. Earthquake Resistant Design of Structures – Pankaj Agarwal & Manish Shrikhande – Prentice Hall of India, New Delhi
3. Earthquake Hazardous Mitigation by R.Ayothiraman and Hemanth Hazarika, I.K.International Publishing House Pvt. Ltd., New Delhi.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand about the Lumped mass and SDOF.	L2
2. Determination of SDOF and MDOF Systems	L3
3. Understand the Seismic coefficient and response spectrum and Base excitation.	L2
4. Understand a Seismic zones and ductile detailing of R.C buildings.	L2
5. Understand an overview of A Seismic Planning and Design of Shear walls.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A16DT.1	3	-	-	2	-	2	2	-	-	1	-	2	1	-	-
20A16DT.2	-	2	1	-	-	1	-	2	-	3	-	-	1	1	-
20A16DT.3	-	3	3	-	-	-	-	-	-	-	-	-	1	1	-
20A16DT.4	2	-	-	2	-	-	3	-	-	2	-	1	1	1	-
20A16DT.5	-	3	3	-	-	-	-	-	-	-	-	-	1	-	-

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

Title of the Course	Transportation Engineering Lab
Category	PCC LAB
Course Code	20A161L
Year	III B. Tech.
Semester	II Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To demonstrate and practically explain students the behavior of various highway materials, to enable them in determining various important properties of pavement materials.

List of Experiments **40**

Road Aggregates:

1. Aggregate Crushing Value
2. Aggregate Impact Test
3. Specific Gravity and Water Absorption
4. Attrition Test
5. Abrasion Test
6. Shape Tests

Bituminous Materials:

1. Penetration Test
2. Ductility Test
3. Softening Point Test
4. Flash and Fire point Test

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Perform quality control tests on pavements and pavement materials.	L3
2. Recognize the knowledge about different physical properties of aggregates by performing different test on road aggregates.	L3
3. Understand the different important engineering properties of road material like aggregate and binding materials.	L1
4. Apply the techniques to characterize various pavement materials through relevant tests.	L3
5. Gain the practical knowledge of tests in aggregates.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A161L.1	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
20A161L.2	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-
20A161L.3	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
20A161L.4	1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
20A161L.5	2	3	2	-	-	-	-	-	-	-	-	-	-	-	-

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

Title of the Course	Soil Mechanics Lab
Category	PCC
Course Code	20A163L
Year	III B. Tech.
Semester	II Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To demonstrate and practically explain students the behavior of various soils and to enable them to determine various important field properties of soils.

List of Experiments **40**

1. Field Density using Core Cutter method.
2. Field Density using Sand replacement method.
3. Natural moisture content using Oven Drying method.
4. Field identification of Fine Grained soils.
5. Specific gravity of Soils.
6. Grain size distribution by Sieve Analysis.
7. Consistency limits: Liquid limit
8. Consistency limits: Plastic limit,
9. Consistency limits: Shrinkage limit.
10. Permeability test using Constant-head test method.
11. Permeability test using Falling-head method.
12. Compaction test by Standard Proctor test.
13. Compaction test by Modified Proctor test.
14. Relative density.
15. Consolidation Test.
16. Triaxial Test (UU)
17. Vane shear test
18. Direct Shear Test
19. Unconfined Compression Strength Test.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Determine the permeability and consolidation parameters of soils through various laboratory	L5
2. Perform laboratory test to determine the maximum dry density and optimum moisture content of the soil	L5
3. Perform laboratory experiments to estimate various Atterberg limits and evaluate index properties of soils	L5
4. Perform various shear strength tests and appreciate the different field conditions.	L5
5. Classify all soils based on their particle size distribution and index properties	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A163L.1	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
20A163L.2	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-
20A163L.3	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
20A163L.4	1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
20A163L.5	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-

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

Title of the Course	Structural Analysis & Design Lab (E TABS)
Category	PCC LAB
Course Code	20A164L
Year	III B. Tech.
Semester	II Semester
Branch	Civil Engineering

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To enable students to understand E TABS as a tool for analysis of various structures.

List of Experiments **40**

1. Introduction to ETABS and various commands of ETABS
2. 2D model, analysis and design of Beam.
3. 2D model, analysis and design for different types of Trusses.
4. 2D model, analysis and design for Frames.
5. 3D model, analysis and design for Frames.
6. 3D model and analysis& Design for RC Buildings.
7. 3D model and analysis& Design for Steel.
8. Earthquake load application to RCC structures along with the design.
9. Earthquake load application to steel structures along with the design.
10. Design & analysis of High-rise storied Building along with wind loads.
11. Application of different building codes in the design of concrete structures.
12. Analysis and design of shear wall.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Outline the importance of ETABS in Analyzing the structures	L5
2. Learn the tools useful for modeling, analyzing, designing a structures	L5
3. Analyse & Design a Building for different loading conditions coming on to the structures	L5
4. Analyse & Design of Multi storied Building	L5
5. Gain the knowledge Design Grouping in Steel structures	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A164L.1	2	-	-	-	3	-	-	-	-	-	-	-	-	-	-
20A164L.2	-	2	3	-	3	-	1	-	1	2	-	1	-	-	-
20A164L.3	-	2	3	-	3	-	-	1	-	2	-	2	--	-	-
20A164L.4	3	3	3	3	-	-	-	-	-	-	-	3	-	-	-
20A164L.5	-	2	3	-	3	-	-	1	-	2	-	2	--	-	-

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

Title of the Course	Constitution of India
Category	MC
Course Code	20AC62T
Year	III B. Tech.
Semester	II Semester
Branch	CSE, CE, AIDS & AIML

Lecture Hours	Tutorial Hours	Practical	Credits
2	0	0	0

Course Objectives:

- To understand the importance of the constitution
- To learn the structure of executive, legislature, and judiciary
- To understand the philosophy of fundamental rights and duties
- To learn the autonomous nature of constitutional bodies like the Supreme Court and High Court, Controller and Auditor General of India and Election Commission of India.
- To understand the union and state financial and administrative relations

Unit 1 **8**

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.

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

- Understand the necessity of framed rules of constitution
- Understand the process of citizenship
- Distinguish fundamental rules from fundamental duties

Unit 2 **12**

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

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

- Understand administrative structure of union government
- Understand the federal nature of Indian Union
- Understand judicial structure at various levels

Unit 3 **10**

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

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

- Understand the administrative structure of state government
- Know the power distribution between CM and Governor

Unit 4 **8**

Local Administration - District Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Panchayati Raj: 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

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

- Understand district administrative structure
- Understand various kinds of local governance in practice
- Know the relevance of local administration in accomplishing grass-root democracy

Unit 5 **10**

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

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

- Understand the autonomous role of ECI in conducting free and fair elections
- Need of various National commissions in the uplift of weaker sections

Prescribed Textbooks

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:

Upon successful completion of the course, student will be able to	Blooms Level of Learning
1. Understand the 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 citizens of India.	L2
4. Understand the decentralization of power between union, state and local self-government.	L2
5. understand the operation of constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy	L2

CO-PO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC62T.1	-	-	-	-	-	-	-	-	-	-	-	2
20AC62T.2	-	-	-	-	-	-	-	-	-	-	-	3
20AC62T.3	-	-	-	-	-	-	-	-	-	-	-	3
20AC62T.4	-	-	-	-	-	-	-	-	-	-	-	2
20AC62T.5	-	-	-	-	-	-	-	-	-	-	-	3

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

Title of the Course Professional Communication
Category SC
Course Code 20AC61L

Year III B. Tech.
Semester II Semester
Branch CSE, CE, AIDS & AIML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives:

- To understand various strategies of resume building
- To understand interview process and be prepared for facing it
- To learn group discussion techniques
- To learn about professional writing and presentations
- To be aware of managerial skills

Resume Preparation: Structure, formats and styles – planning - defining career objective - projecting one's strengths and skills - creative self-marketing - sample résumés -cover letter.

Interview Skills: Concepts and process - pre-interview planning - preparation body language -answering strategies - frequently asked questions - mock interviews - students taking up the roles of interviewer and interviewee

Group Discussion: Communicating views and opinions - discussing - intervening - agreeing and disagreeing – asking for and giving clarifications – substantiating - providing solutions on any given topics across a cross – section of individuals - modulations of voice and clarity - body language - case study – observation of group behaviors – social etiquette

Presentation Skills (Individual and Team): Collection of data from various sources - planning, preparation, and practice - types of audience - attention-getting strategies – transitions - handling questions from audience **–** dealing with difficult audience

Technical Report Writing: Types of formats and styles, subject matter, clarity, coherence and style, planning – data collection and analysis, report preparation, preparation of figures and tables, references

Managerial skills: Personality traits such as integrity, accountability, assertiveness, adaptability, diplomacy and dynamism - innovative strategies for dealing with different people in different contexts - showcasing live examples, sharing anecdotes and inspiring quotes related to leadership qualities

Learning Resources: Soft Skills lab manual prepared by Dept. of H&S, AITS Rajampet

Course Outcomes:

Upon successful completion of the course, students will be able to	Bloom's Level of Learning
1. Express themselves fluently in social and professional contexts.	L4
2. Make Presentations confidently	L5
3. Face interviews confidently and to participate in meetings effectively	L4
4. Participate in group discussions confidently	L4
5. Write technical reports	L4
6. Lead a team as a manager of the group	L5

CO-PO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC61L.1	-	-	-		-	-	-	-	-	3	-	3
20AC61L.2	-	-	-	-	-	-	-	-	-	3	-	3
20AC61L.3	-	-	-	-	-	-	-	-	-	3	-	3
20AC61L.4	-	-	-	-	-	-	-	-	-	3	-	3
20AC61L.5	-	-	-	-	-	-	-	-	-	3	-	3
20AC61L.6	-	-	-	-	-	-	-	-	-	3	-	3

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

Title of the Course	Advanced RCC Design
Category	PEC
Course Code	20A17AT
Year	IV B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To strengthen the basic fundamentals of design of RCC structures and to apply these basic fundamentals for the design of advanced reinforced concrete structures.
- The primary objective of the course is to extend student's knowledge and proficiency in reinforced concrete structural design, analysis, and special detailing
- To provide students' knowledge to design of structural elements subjected to different loading conditions.
- To make the student more conversant with the design principles of water tanks and other important structures.
- To make the student more conversant with the design principles of retaining walls and other important structure

Unit 1 Flat Slabs **10**

Flat Slabs: Elements of flat slabs, Codal procedure for design of flat slabs, Behavior of flat slab in shear, One way and two way shear, design of flat slab

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

- IS code recommended methods to design flat slabs (L3)

Unit 2 Bunkers & silos **10**

Design of concrete bunkers of circular shape – (excluding staging) – Introduction to silos

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

- Design bunkers and silos. (L3)

Unit 3 Grid floor **10**

Design of grid floor -

Design of slab less tread – riser stair case. Design of Longitudinal staircase

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

- Design a Grid floor system. (L3)
- Design a Stair case system (L3)

Unit 4 Retaining Wall **10**

Design of cantilever and counter forte retaining wall with horizontal back fill

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

- Design retaining walls for different practical conditions. (L3)
- Design Cantilever and counter fort retaining wall (L3)

Unit 5 Water Tank **8**

Design of Intz water tank excluding staging.-

Design of circular and rectangular water tank resting on the ground

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

- Design different water tanks. (L3)
- Design Rectangular and Intz tank (L3)

Prescribed Text Books:

1. Advanced R.C.C by Krishnam Raju, CBS Publishers & distributors, New Delhi.
2. Structural Design and drawing (RCC and steel) by Krishnam Raju, Univ.Press , New Delhi
3. R.C.C Structures by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications, New Delhi

Reference Books:

1. Advanced RCC by Varghese, PHI Publications, New Delhi.
2. Design of RCC structures by M.L.Gambhir P.H.I. Publications, New Delhi.
3. R.C.C Designs by Sushil kumar , standard publishing house.
4. Fundamentals of RCC by N.C.Sinha and S.K.Roy, S.Chand Publications, New Delhi.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Analyze and design flat slabs.	L4,L5
2. Analyze and design the concrete bunkers.	L4,L5
3. Analyze and design the dog legged and longitudinal stair.	L4,L5
4. Analyze and design the cantilever & counter fort retaining walls.	L4,L5
5. Analyze and design the circular and rectangular water tanks resting on the ground and Intz tank (without staging)	L4,L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A16AT.1	1	-	-	-	-	3	-	-	-	3	-	1	-	-	-
20A16AT.2	-	3	3	3	-	3	-	2	1	3	-	1	-	-	-
20A16AT.3	-	3	3	3	-	3	-	2	1	3	-	1	-	-	-
20A16AT.4	-	3	3	3	-	3	-	-	1	3	-	1	-	-	-
20A16AT.5	-	-	-	-	-	3	-	-	-	3	-	1	-	-	-

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

Title of the Course	Advanced Transportation Engineering
Category	PEC
Course Code	20A17BT
Year	IV B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- This course imparts the students' knowledge of planning, design, construction and maintenance of railway tracks
- To have knowledge in Airport planning and design with the prime focus on runway and taxiway geometrics
- To acquire knowledge on site investigation for location and planning of harbors.

Unit 1 Railways in India 10

Railway: Transportation and its development, Long term operative plans for Indian Railways. Classification of Railway lines and their track standards, Railway terminology, Traction and tractive Resistance, Hauling capacity and tractive effort of locomotives, different Types of Tractions Role of Indian Railways in National Development – Railways for Urban Transportation – Modern developments, tube railways, high speed tracks. Alignment- basic requirements and factors affecting selection, Component parts of a railway track - requirements and functions - Typical cross-section

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

- Importance of Railways and various types of efforts by the government to bring up the railways. (L1)
- Cross section of a railway. (L2)

Unit 2 Geometric Design of Railway Track 10

Permanent Way: Components and their Functions: Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Creeps and kinks, Stresses in railway track, high speed track, Sleepers – Functions, Materials, Density, Ballast less Tracks.

Geometric design of railway track: Geometric design of railway track, Gauge, Gradient, speed, super elevation, cant or camber deficiency, Negative super elevation, curves, length of transition curves, grade compensations.

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

- Understand different materials used in a railway track. (L4)
- Design of various aspects of railway track. (L5)

Unit 3 Railway Operation and Control 10

Railway operation and control: Points and Crossings – Design features of a turnout – Details of station yards and marshaling yards – Signaling, interlocking of signals and points - Principles of track circuiting – Control systems of train movements – ATC, CTC – track circuiting.

Maintenance: Introduction to track maintenance, Items of track maintenance, packing and over hauling, screening.

Railway accidents: Human and system contribution to catastrophic accidents, Human Factors in Transport Safety.

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

- Various features and important components involved in operation and maintenance of railway tracks. (L1)
- Various accidents and involvement of humans in such accidents. (L2)

Unit 4 **8**

Scope and application, historical developments, art of tunneling, tunnel engineering, future tunneling considerations.

Tunneling Methods: Types and purpose of tunnels; factors affecting choice of excavation technique; Methods - soft ground tunneling, hard rock tunneling, shallow tunneling, deep tunneling; Shallow tunnels – cut and cover, cover and cut, pipe jacking, jacked box excavation techniques, methods of muck disposal, supporting, problems encountered and remedial measures.

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

- Define and understand problems associated with tunnels. (L1)
- Know and define various tunneling methods. (L2)

Unit 5 Airport Planning **12**

Growth of Air Transport, Technological Developments, Institutional Development for Planning, Regulatory Practices; Aircraft characteristics related to airport planning and design, Future trends in Air craft design and Airport Planning; Airport master plan, site selection, planning surveys etc. Airport Obstructions: Zoning Laws, Classification, Approach and Turning Zones.

Runway And Taxiway Design: Orientation of runway – Use of wind rose diagram – Runway length and corrections to be applied – Numerical examples for computation of runway length – Geometric elements of runway – Design standards and specifications – Geometric design of Taxiways – Standards and specifications – Runway lighting system.

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

- Learn and understand the importance or airport and its design components. (L1)
- Design runways, runway lighting and taxiways. (L5)

Prescribed Text Books:

1. Mundrey J. S, Railway Track Engineering, Tata McGraw Hill, 2009.
2. Rangawala, S.C., Railway Engineering, Charotar Publishing House
3. Rao G. V, Principles of Transportation and Highway Engineering, Tata McGrawHill, 1996.
4. Srinivasan,R, Harbour, Dock& Tunnel Engineering, Charotar Publishing House, 28e, 2016.
5. Air Transportation Planning & design, Virendhra Kumar & Statish Chandhra –Gal Gotia Publishers (1999).

Reference Books:

1. Bindra, S.P., A course in Docks and Harbour Engineering, Dhanpat Rai& Sons
2. Chandra, S. & Agarwal, M.M., Railway Engineering, Oxford University Press, New Delhi, 2008
3. Saxena, S. C and Arora, S. P, Railway Engineering, Dhanpat Rai& Sons, 7e, 2010
4. Subhash C. Saxena, Railway Engineering, Dhanpat Rai& Sons

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the Importance of Indian Railways.	L1, L2
2. Understand the Planning construction and maintenance of railway tracks..	L3
3. Understand about the Railway signals and railway tracks.	L3
4. Memorize the historical developments in tunnels.	L2
5. Understand the knowledge in Airport planning and design with the prime focus on runway and taxiway geometrics.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17BT.1	2	2	-	2	2	-	2	-	-	2	-	-	-	-	-
20A17BT .2	-	-	2	-	-	3	-	-	-	-	-	2	-	-	-
20A17BT.3	3	2	2	2	-	-	-	-	3	-	-	-	-	-	-
20A17BT .4	-	-	-	-	-	3	2	-	-	-	-	-	-	-	-
20A17BT .5	2	-	-	2	-	2	-	-	-	2	-	3	-	-	-

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

Title of the Course	Bridge Engineering
Category	PEC
Course Code	20A17CT
Year	IV B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To acquaint students with the basics of bridge design under different condition and all the auxiliary load bearing components of a bridge.

Unit 1 Bridges, Box Culverts and Bearings. 10

Introduction: Importance of site investigation in Bridge design. Highway Bridge loading standards. Impact factor. Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges.
Box Culvert: General aspects. Design loads, Design of Box culvert subjected to RC class AA tracked vehicle only.
Bridge Bearings: General features – Types of Bearings – Design principles of steel Rocker &Roller Bearings – Design of a steel Rocker Bearing – Design of Elastometric pad Bearing.
Learning Outcomes: At the end of the unit, the student will be able to learn

- Investigate the suitability of a site for the design of a bridge. (L4)
- Understand the design of a box culvert and the behavior of different types of bearings. (L3)

Unit 2 Deck Slab Bridge 10

Introduction – Effective width method of Analysis Design of deck Slab Bridge (Simply supported) subjected to class AA Tracked Vehicle only.
Learning Outcomes: At the end of the unit, the student will be able to learn

- Design a deck slab bridge. (L4)
- Know the load dispersion of the slab for different types of IRC loadings. (L3)

Unit 3 T Beam Bridges (Beam and Slab Bridges) 10

General features – Design of interior panel of slab – Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only.
Learning Outcomes: At the end of the unit, the student will be able to learn

- Understand and design various components of a Beam and Slab bridge. (L4)
- Learn about the use of Pigeauds curves and SP 16 and IRC: 6-2000 (L4)

Unit 4 Bridges 8

Plate Girder Bridge: Introduction – elements of a plate girder and their design. Design of a Deck type welded plate girder – Bridge of single line B.G.
Composite Bridges: Introduction – Advantages – Design of Composite Bridges consisting of RCC slabs over steel girders' including shear connectors
Learning Outcomes: At the end of the unit, the student will be able to learn

- Design of Plate Girder Bridge(L4)
- Design of Composite bridge (L4)

Unit 5 Piers & Abutments 12

General features – Bed Block – Materials piers & Abutments Types of piers – Forces acting on piers – Stability analysis of piers – General features of Abutments – forces acting on abutments – Stability analysis of abutments – Types of wing walls – Approaches – Types of Bridge foundations (excluding Design).

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

- Understand Piers and Abutments. (L3)
- Analyse the Stability of Abutments. (L4)

Prescribed Text Books:

1. Bridge Engineering by PonnuSwamy, TATA Mcgraw Hill Company, New Delhi.
2. Design of Bridges by N.KrishnamRaju, Oxford & IBH, Publishing Company Pvt.ltd., Delhi.
3. Design of Bridges Structure by T.R.Jagadish&M.A.Jayaram Prentice Hall of India Pvt., Delhi.
4. Design of Bridges Structure by D.J.Victor
5. Relevant – IRC & Railway bridge Codes.

Reference Books:

1. Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
2. Design of Steel structures by Ramachandra.
3. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Implement standard loading specifications for bridge design followed by IRC codes and design of Box culverts and Bridge bearings.	L4
2. Learn about Analyze and perform design of RC deck slab.	L3
3. Acquire the knowledge about Analyze and perform design of RC T-Beam Bridges	L4
4. Analyze and perform Design of Plate Girder Bridge and Composite bridges.	L4
5. Analyze and design various piers and abutments of the bridge structures.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17CT.1	-	3	3	-	-	-	1	2	-	-	-	-	-	-	-
20A17CT.2	-	3	3	-	-	-	1	1	-	-	-	-	-	-	-
20A17CT.3	-	3	3	-	-	-	1	1	-	-	-	-	-	-	-
20A17CT.4	-	3	3	-	-	-	2	1	-	-	-	-	-	-	-
20A17CT.5	-	3	3	-	-	-	1	1	-	-	-	-	-	-	-

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

Title of the Course	Structural Health Monitoring, Repair and Rehabilitation of Structures
Category	PEC
Course Code	20A17DT
Year	IV B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- This course introduces to the student the causes of concrete structures failures and methods available to rehabilitate and for retrofitting the structures with economical applications.

Unit 1 Introduction **10**

Introduction – Deterioration of Structures – Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage

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

- Preventive measures for the deterioration of concrete structures(L1)
- Understand the mechanism of damage in structures (L2)

Unit 2 Corrosion and Fire **10**

Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation.

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

- Damage of structure due to the corrosion (L3)

Unit 3 Inspection and Evaluating **10**

Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment – NDT.

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

- Asses the condition of the structure using NDT (L3)

Unit 4 Repairs and Strengthening **8**

Repair of Structure – Common Types of Repairs – Repair in Concrete Structures – Repairs in Under Water Structures – Guniting – Shotcrete – Underpinning. Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

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

- Understand the repairs of the structure (L3)
- Suggest the strengthening methods for the damaged structures (L3)

Unit 5 Structural Health Monitoring **12**

Health Monitoring of Structures – Use of Sensors – Building Instrumentation.

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

- Monitoring of the structures using different types of sensors (L4)

Prescribed Text Books:

1. Concrete Technology by A.R. Santakumar, Oxford University press

2. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.
3. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press

Reference Books:

1. Diagnosis And Treatment Of Structures In Distress By R.N.Raikar, Published By R&D Centre Of Structural Designers & Consultants Pvt.Ltd., Mumbai, 1994.
2. Handbook On Repair And Rehabilitation Of RCC Buildings, Published By CPWD, Delhi, 2002.
3. Earthquake Resistant Design Of Structures By Pankaj Agarwal And Manish Shrikhande, Prentice-Hall Of India, 2006.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Get the knowledge of Assess the strength and materials deficiency in concrete structures	L1
2. Gain the knowledge of Suggest methods and techniques used in repairing / strengthening existing concrete structures	L3
3. Get the knowledge of Non Destructive Testing techniques to field problems	L3
4. Gain the knowledge Apply cost effective retrofitting strategies for repairs in buildings	L3
5. Learn the Assess of strength and materials deficiency in concrete structures	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17DT	2	3	-	-	1	-	-	-	-	-	-	-	-	-	-
20A17DT	3	3	-	3	2	-	-	1	-	-	-	-	-	-	-
20A17DT	2	1	-	2	2	-	-	1	-	-		2	-	-	-
20A17DT	2	1	-	2	2	-	-	1	-	-	-	2	-	-	-
20A17DT	2	-	-	3	3	-	-	2	-	-	-	2	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Civil engineering

Title of the Course	Foundation Engineering
Category	PEC
Course Code	20A17ET
Year	IV B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To impart knowledge to plan and execute a detail site investigation programme and to select geotechnical design parameters and type of foundations. The course also aims to familiarize the students for the geotechnical design of different type of foundations and retaining walls.

Unit 1 Soil Exploration **9**

Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Plate load test – Pressure meter – planning of exploration Programme and preparation of soil investigation report.

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

- Various methods of soil and sub soil investigations. (L2)
- Prepare a soil investigation report. (L1)

Unit 2 Earth Slope Stability **9**

Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish circle method, standard method of slices, Bishop's Simplified method – Taylor's Stability Number-Stability of slopes of earth dams under different conditions.

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

- Perform the stability analysis of slopes using different methods. (L3)

Unit 3 Earth Pressure Theories **10**

Lateral earth pressure theory, Different types of earth pressures, Rankine's active and passive earth pressures, pressure distribution diagram for lateral earth pressures against retaining walls for different conditions in cohesionless and cohesive soils, Coulomb's earth pressure theory, Graphical techniques-Rebhann's and Culmann's construction.

Retaining Walls: Types of retaining walls-Design of Gravity and cantilever retaining walls – stability of retaining walls.

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

- Determine the pressure of earth acting on different types of retaining walls. (L4)
- Analyse the stability of earth retaining walls. (L2)

Unit 4 Shallow Foundations **10**

Functions and requisites - Different types of foundations - choice of foundation type - types of failures – general principles of design. Bearing capacity - Basic Definitions - Bearing capacity analysis by Terzaghi's, meyerhoff and skempton's analysis - Bearing capacity based on settlement and building codes.

Field measures – SPT, CPT and Plate load tests.

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

- Determine the bearing capacity of soil. (L4)
- Choose the type of foundation required for a given situation. (L4)

Unit 5 Pile Foundation 10

Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae – Pile load tests – Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

Well Foundations: Types – Different shapes of wells – Components of wells – functions and Design Criteria – Sinking of wells – Tilts and shifts.

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

- Determine the load carrying capacity of piles (Single and group). (L4)
- Learn various aspects of well foundations. (L4)

Prescribed Text Books:

1. Soil Mechanics and Foundation Engineering by K R Arora, Standard Publishers and Distributors, Delhi
2. Geotechnical Engineering by C. Venkataramaiah.
3. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi

Reference Books:

1. Das, B.M., - (1999) Principles of Foundation Engineering –6th edition (Indian edition) Thomson Engineering
2. Bowles, J.E., (1988) Foundation Analysis and Design– 4thEdition, McGraw-Hill Publishing company, Newyork.
3. Analysis and Design of Substructures – Swami Saran,Oxford and IBH Publishing company Pvt Ltd (1998)

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand soil exploration methods	L2
2. Analyze the stability of slopes	L3
3. Understand the prediction of the earth pressure over the earth resisting structures and their Geotechnical design.	L2
4. Define various geotechnical designs and select type of shallow foundations.	L3
5. Determine the load carrying capacity of piles, pile efficiency of deep foundations.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17ET.1	2	-	-	2	-	3	3	-	-	-	-	2	-	-	-
20A17ET.2	2	3	-	2	-	3	3	-	-	-	-	2	-	-	-
20A17ET.3	3	3	-	2	-	3	3	-	-	-	-	2	-	-	-
20A17ET.4	-	3	-	2	-	3	3	-	-	-	-	2	-	-	-
20A17ET.5	-	3	-	2	-	3	-	-	-	-	-	-	-	-	-

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

Title of the Course	Finite Element Method
Category	PEC
Course Code	20A17FT
Year	IV B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- The subject should enable the students to learn the principles involved in discretization in finite element methods, forming of strain displacement and stiffness matrices for simple elements, to know the various approaches followed in finite element analysis.
- The subject should enable the students to learn usage of the various elements for discretization and to learn about shape functions.

Unit 1 Introduction 12

Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.

Principles of Elasticity: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading

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

- Basic concepts of Finite element methods (L1)
- Know about axis symmetric bodies (L1)

Unit 2 One Dimensional Elements 12

Stiffness matrix for bar element – shape functions for one dimensional elements – one dimensional problems.

Two Dimensional Elements: Different types of elements for plane stress and plane strain analysis – Displacement models – generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinate

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

- Learn solving one dimensional problems. (L4)
- Determine geometric invariance, Understand natural coordinate system. (L4)

Unit 3 Nodes and Element 8

Generation of element stiffness and nodal load matrices for 3-node triangular element and four noded rectangular elements

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

- Know how to generate an elemental stiffness matrices (L4)
- Know how to generate an three noded triangular and rectangular elements (L4)

Unit 4 Isoparametric Formulation 10

Concepts of isoparametric elements for 2D analysis –formulation of CST element, 4 –Noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements

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

- Formulate various elements for 2D analysis. (L2)
- Formulate the CST element and 4 noded and 8 noded quadrilateral elements. (L4)

Unit 5 Solution Techniques **10**

Numerical Integration, Static condensation, assembly of elements and solution techniques for static load.

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

- Solve the numerical integration problems. (L5)
- Know how to assemble the elements. (L4)

Prescribed Text Books:

1. Finite element analysis in Engineering by S.Md.Jalaludeen –Anuradha publications-Chennai
2. Finite Elements Methods in Engineering by Tirupati. R. Chandrnpatla and Ashok D. Belegundu – Pearson Education Publications.
3. Finite element analysis by S.S. Bhavakatti-New age international publishers
4. Finite element analysis in Engineering Design by S.Rajasekharan, S.Chand Publications, New Delhi.
5. Finite Element analysis – Theory & Programming by C.S.Krishna MurthyTata Mc.Graw Hill

Reference Books:

1. Concepts and Applications of Finite Element Analysis by Robert D.Cook, David S. Malkus and Michael E.Plesha. Jhon Wiley & Sons
2. Finite element analysis by David V Hutton, Tata Mcgraw Hill, New Delhi
3. Applied Fem by Rammurthy, I.K.International Publishers PVt. Ltd., New Delhi.
4. Fem by J.N.Reddy, Mcjraw, TMH Publications, New Delhi.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand basic concepts of Finite element methods and axis symmetric bodies.	L3
2. Understand solving one dimensional problem, determine geometric invariance, and understand natural coordinate system.	L4
3. Understand how to generate an elemental stiffness matrices and three noded triangular and rectangular elements	L4
4. Formulate various elements for 2D analysis and CST element and 4 noded and 8 noded quadrilateral elements	L2, L4
5. Solve the numerical integration problems and assembling elements	L4, L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17FT.1	3	2	2	-	-	-	-	-	-	-	-	-	-	-	1
20A17FT.2	2	1	-	-	-	-	-	-	1	1	-	-	1	-	1
20A17FT.3	1	3	-	-	-	-	-	-	-	-	-	-	1	1	1
20A17FT.4	2	-	-	-	-	-	-	-	-	-	-	-	-	1	-
20A17FT.5	3	-	-	-	-	-	-	-	2	-	-	-	1	1	-

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

Title of the Course	Design and Drawing of Irrigation Structures
Category	PEC
Course Code	20A17GT
Year	IV B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To make the student more conversant with the design principles of Surplus weir, Glacis Weir, Sluice Tank, Trapezoidal notch, important structures belonging to irrigation

Plate No. **Design and drawing of the following irrigation structures** **10**

1. Surplus Weir
2. Tank Sluice with a tower head
3. Trapezoidal Notch fall
4. Sloping Glacis Weir
5. Canal Regulator
6. Type III Syphon aqueduct

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

- The design of various components of a surplus weir, Tank Sluice with a tower head, Trapezoidal Notch fall, Sloping Glacis Weir, Canal Regulator, Type III Syphon aqueduct. (L4)

Final Examination pattern: Any two questions of the above six designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Design the Surplus weir, Tank Sluice with a tower head	L1,L2
2. Apply the fundamentals and designing the irrigation structures with simple aspects.	L1
3. Analyze the notches and regulators.	L3
4. Analyze the designs concepts of an aqueduct.	L4,L5

Prescribed Text Books:

1. Design of minor irrigation and Canal Structures by C.Satyanarayana Murthy, Wiley Eastern Ltd.

Reference Text Books:

1. Irrigation Engineering and Hydraulic Structures by Santosh Kumar Garg, Khanna Publishers

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17GT.1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
20A17GT.2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20A17GT.3	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
20A17GT.4	-	-		4	5	-	-	-	-	-	-	-	-	-	-
20A17GT.5	-	-		-	-		-	-	-	-	-	-	-	-	-

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

Title of the Course	Experimental Stress Analysis
Category	PEC
Course Code	20A17HT
Year	IV B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To understand the principles of pre stressing and design of pre stressed elements loss of prestress, other concept that help students in designing of prestressed elements.

Unit I Principles of Experimental Approach : 10

Merits of Experimental Analysis Introduction, uses of experimental stress analysis advantages of experimental stress analysis, Different methods –Simplification of problems.

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

- Learn the importance of experimental stresses. (L2)
- Learn the concept of Simplification of problems.(L2)

Unit II Strain Measurement Using Strain Gauges 9

Definition of strain and its relation of experimental, Determinations Properties of Strain Gauge Systems-Types of Strain – Gauge Systems-Types of Strain Gauges – Mechanical, Acoustic and Optical Strain Gauges

Electrical Strain Gauges : Inductance strain gauges – LVDT – Resistance strain gauges – various types – Gauge factor – Materials of adhesion base etc.

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

- Know about the uses of strain gauges and applications. (L3)
- Know about the uses of Inductance strain gauges (L3)

Unit III Strain Rosettes 12

Introduction – the three elements Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge.

Non-Destructive Testing :

Ultrasonic Pulse Velocity method – Application to Concrete – hammers Test Application to Concrete.

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

- Know the applications of strain rosettes. (L4)
- Know the applications of NDTs in concrete (L4)

Unit IV Brittle Coating Methods 10

Introduction – Coating Stress – Failure Theories – Brittle Coating Crack Patterns – Crack Detection – Types of Brittle Coating – Test Procedures for Brittle Coating Analysis – Calibration Procedures – Analysis of Brittle Coating Data.

Theory of Photo elasticity : Introduction – Temporary Double refraction – The stress Optic Law –Effects of stressed model in a polariscope for various arrangements –Fringe Sharpening. Brewster's Stress Optic law.

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

- Know the Brittle Coating Crack Patterns. (L3)
- Know the Theory of Photo elasticity. (L3)

12

Unit V Two Dimensional Photo elasticity

Introduction – Isochramic Fringe patterns – Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Iso-clinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses –Materials for photo – Elasticity Properties of Photoelastic Materials.

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

- Analyse two Dimensional Photo elasticity. (L4)
- Know about the Compensation techniques.(L3)

Prescribed Text Books:

1. Experimental stress analysis by J.W.Dally and W.F.Riley
2. Experimental stress analysis by Dr.Sadhu Singh.
3. Experimental stress analysis by Vazrani & Ratwani

Reference Books:

1. Experimental stress Analysis, Srinath L.S tata Mc Graw Hill.
2. Photo elasticity Vol I and Vol II, M.M.Frocht, John Wiley & sons.
3. Photo Elastic Stress Analysis, Kuske, Albrecht & Robertson John Wiley & Sons.
4. Motion Measurement and Stress Analysis Dave and Adams
5. Holman, Experimental Methods for Engineers Tata McGraw Hill Companies, 7th Edition, New York, 2007.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Know about the merits and de merits of experimental stress analysis.	L2
2. Apply the fundamental knowledge about Strain Measurement Using Strain Gauges and Electrical Strain Gauges.	L3
3. Know about Strain Rosettes and applications of NDT Tests.	L4
4. Learned method of Brittle Coating Methods and Theory of Photo elasticity.	L6
5. Know about the Two Dimensional Photo elasticity.	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17HT 1	2	-	2	-	1	2	-	1	1	1	1	1	1	1	1
20A17HT 2	1	1	-	-	-	-	-	-	1	-	-	-	1	-	1
20A17HT 3	1	1	-	-	-	1	-	-	-	1	-	-	1	-	-
20A17HT 4	-	2	-	-	-	-	1	-	-	1	-	-	1	-	-
20A17HT 5	-	2	-	-	-	1	-	-	-	1	-	1	-	1	1

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

Title of the Course	Prestressed Concrete
Category	PEC
Course Code	20A17IT
Year	IV B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To understand the principles of prestressing and design of prestressed elements loss of prestress, other concept that help students in designing of prestressed elements.

Unit 1 Introduction To Prestressed Concrete **10**

Historic development – General principles of pre-stressing pre-tensioning and post tensioning –Advantages and limitations of pre-stressed concrete – Materials – High strength concrete and high tensile steel their characteristics. IS Code provisions, Methods and Systems of Prestressing; Pretensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.

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

- Learn the importance of prestressed concrete structures. (L2).
- Learn the concept of prestressing methods. (L2).

Unit 2 Losses of Prestress **9**

Loss of pre-stress in pre-tensioned and post-tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage bending of member and frictional losses.

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

- Various losses of prestress in pre-tensioned can be analyzed. (L2)
- Various losses on prestress in post-tensioned members can be analyzed. (L3)

Unit 3 Analysis of Sections For Flexure **12**

Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.

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

- Analysis of different types of tendons for flexure can be done. (L4)
- Analysis of concrete beams with eccentric and parabolic tendons (L4)

Unit 4 Design of Sections for Flexure and Shear **10**

Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure, shear, and principal stresses – design for shear in beams – Kern – lines, cable profile.

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

- Design of prestressed concrete rectangular and I-sections can be learnt. (L4)
- Design of prestressed concrete members under flexure. (L4)

Unit 5 Analysis of End Blocks **12**

By Guyon's method and Magnel method, Anchorage zone stresses – Approximate method of design – Anchorage zone reinforcement – Transfer of prestress pre-tensioned members.

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

- Analysis of End blocks of prestressed concrete members using various methods.(L3)
- Analysis of Anchorage zone reinforcement in prestressed concrete members.(L4)

Prescribed Text Books:

1. Prestressed Concrete by Krishna Raju; - Tata Mc.Graw Hill Publications.
2. Prestressed Concrete by N.Rajasekharan; - Narosa publications.
3. Codes: BIS code on prestressed concrete, IS 1343

Reference Books:

1. Prestressed Concrete by Ramamrutham; Dhanpat rai Publications.
2. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns, John Wiley & Sons

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Illustrate basic theories and the fundamental behaviour of prestressed concrete.	L2
2. Know about fundamental knowledge of different losses in prestressed concrete	L3
3. Analyze Different types of Sections for Flexure with different profiles.	L4
4. Analyze method of analysis of pre-stressed structural components.	L4
5. Design the Anchorage zone stresses.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17IT 1	2	-	2	-	1	2	-	1	1	1	1	1	1	1	1
20A17IT 2	1	1	-	-	-	-	-	-	1	-	-	-	1	-	1
20A17IT 3	1	1	-	-	-	1	-	-	-	1	-	-	1	-	-
20A17IT 4	-	2	-	-	-	-	1	-	-	1	-	-	1	-	-
20A17IT 5	-	2	-	-	-	1	-	-	-	1	-	1	-	1	1

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

Title of the Course	Environment Impact Assessment & Life Cycle Assessment
Category	PEC
Course Code	20A17JT
Year	IV B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To acquaint the students about the importance of impact assessment with respect to various projects and the procedure of impact assessment on a whole.
- To familiarize students about the life cycle of a material or a product and help them to assess how much resources are being wasted.

Unit 1 Environment Impact Assessment 10

Introduction: Environment, Impacts, Assessment; Methods of EIA: Ad-hoc Method, Checklist Method, Environmental Index Method, Network Method, Overlay Method, Cost/ Benefit analysis, Simulation Methods. Steps Involved in EIA (Brief). EIS, Strategic EIA, Project EIA.

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

- Learn the basics of EIA. (L2)
- Know various methods to perform EIA. (L1)

Unit 2 Impacts and Impact Prediction 9

Screening; Scoping; Baseline study; Different Impacts: Direct Impacts, Indirect Impacts, Cumulative Impacts, Induced Impacts; Cultural Impacts, Economic Impacts, Wellbeing impacts, Policy impacts, Environmental impacts, social impacts, Training impact. Impact prediction: Baseline study, simulating conditions, Methods fo predicting the impact; Uncertainty in prediction.

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

- Various steps involved in the Impact Assessment. (L3)
- Predict various impacts form a given activity. (L2)

Unit 3 Mitigation, Review and Follow-up 12

Mitigative measures for various impacts; Methods and importance of review; Follow-up of the government agencies; MOEFCC Draft rules for EIA; Case Study of any two Types of projects (Dam/Reservoir/Power Plant (Thermal/Nuclear/Hydrologic)/Road/ any industry).

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

- Mitigation of various impacts. (L4)
- Important case studies. (L4)

Unit 4 Life Cycle Assessment 10

Definition and Role of LCA; Goal definition and Scoping; Inventory analysis, Impacts and assessment; Interpretation; Energy Issues of Life Cycle; Life Cycle Costing LCC.

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

- Define Life cycle assessment. (L6)
- Understand various steps involved in LCA. (L6)

Unit 5 LCA Inventory 12

Inventory, Inventory framework, Inventory analysis, Objectives of the study, System Boundaries and their definition, Inventory checklist, Stages involved in LCA: Raw materials acquisition stage, Manufacturing stage, Product fabrication stage, Packaging or Filling or Distribution stage, Reuse/Maintenance Stage, Recycle stage. Subsystem Boundaries for above stages; Life cycle assessment (LCA) of sustainable building materials: an overview, Life-Cycle Assessment of Buildings

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

- Understand various stages involved in manufacturing and their impacts on the nature, (L2)

Prescribed Text Books:

1. L W Canter, Environmental Impact Assessment, Mc Graw hill, 1996.
2. Battelle Memorial In, Mary Ann Curran, - Life-Cycle Assessment_ Inventory Guidelines and Principles 1994.
3. https://www.iisd.org/

Reference Books:

1. Nieuwlaar, E. (2004). Life Cycle Assessment and Energy Systems. Encyclopedia of Energy, 647–654. doi:10.1016/b0-12-176480-x/00233-3

Course Outcomes:

At the end of the course, the student will be able to,	Blooms Level of Learning
1. know various methods to perform EIA and learn the basics of EIA.	L1, L2
2. predict various impacts form a given activity and various steps involved in the Impact Assessment.	L2, L3
3. mitigation of various impacts and important case studies	L4
4. Define Life cycle assessment and understand various steps involved in LCA	L6
5. understand various stages involved in manufacturing and their impacts on the nature	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17JT 1	2	-	2	-	1	2	-	1	1	1	1	1	1	1	1
20A17JT 2	1	1	-	-	-	-	-	-	1	-	-	-	1	-	1
20A17JT 3	1	1	-	-	-	1	-	-	-	1	-	-	1	-	-
20A17JT 4	-	2	-	-	-	-	1	-	-	1	-	-	1	-	-
20A17JT 5	-	2	-	-	-	1	-	-	-	1	-	1	-	1	1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Department of CIVIL ENGINEERING

Title of the Course	Ground Improvement Techniques
Category	PEC
Course Code	20A17KT
Year	IV B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To understanding of the concepts behind a range of Ground Improvement Techniques, and be able to identify appropriate techniques for a range of ground and site conditions.
- Learn many ground improvement techniques including vibro flotation and preloading including sand drains
- To get familiarize about different methods of ground improvement in cohesive and granular soil.
- To get knowledge on expansive soils, ground improvement techniques, reinforced earth retaining structures, drainage and dewatering and grouting techniques.
- To understand the expansive soil properties and apply the same for the design of structures on expansive soils.

Unit 1 Dewatering & Grouting 8

Introduction- Seepage, Filter requirements, Ground water, ground water and seepage control. Methods of de-watering systems- Open Sumps and Ditches - Well point Systems -Deep well Drainage, Vacuum Dewatering systems, Dewatering by Electro osmosis.

Grouting: Introduction, Objectives of grouting- grouts and their properties-grouting methods ascending, descending and stage grouting- hydraulic fracturing in soils and rocks post grout test

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

- Explain about the dewatering & methods of dewatering (L1)
- Discuss the merits and demerits of methods of dewatering (L1)
- Explain about grouting and grouts properties (L1)
- Discuss the merits and demerits of various methods of grouting (L1)

Unit 2 Densification Methods in Granular & Cohesive Soils 10

Densification Methods In Granular Soils:-In – situ densification methods in granular Soils:– Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth.

Densification Methods In Cohesive Soils:–In – situ densification methods in Cohesive soils:– preloading or dewatering, Vertical drains – Sand Drains, Sand wick geodrains – Stone and lime columns – thermal methods.

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

- Explain about vibration and impact (L3)
- Explain in situ densification methods of granular and cohesive soils (L3)
- Discuss the merits and demerits of various in-situ densification methods (L2)

Unit 3 Stabilization 10

Introduction- Requirements of Soil stabilization, Mechanical Stabilization, Cementing Stabilization, Bituminous Stabilization, Chemical Stabilization, Factors affecting the materials. Stabilization using industrial wastes Construction methods and applications

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

- Explains stabilization importance (L3)
- Explains stabilization - type of admixtures, mechanism (L3)
- Discuss the merits and demerits of various methods of stabilization (L2)

Unit 4 Reinforced Soiland Geosynthetics 10

Soil Reinforcement: - Materials, Applications, Columns Formed In-Situ, soil interaction – applications. Geosynthetics: - Geosynthetic types – Properties of geosynthetics. – Geo grids and Geomembranes – Functions and Applications

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

- Explain about reinforced soil(L3)
- Explain importance of reinforcement(L3)
- Explain about applications of geosynthetics(L3)

Unit 5 Expansive Soils 10

Expansive Soils: Problems of expansive soils – tests for identification – methods of determination of swell pressure. Improvement of expansive soils – Foundation techniques in expansive soils – under reamed piles.

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

- Explain importance of expansive soils (L4)
- Explain importance of Foundation techniques in expansive soils (L4)
- Demonstrate basic knowledge about design principles of under reamed piles (L4)

Prescribed Text Books:

1. Hausmann M.R. (1990), Engineering Principles of Ground Modification, McGraw-Hill International Edition.
2. Dr.P.Purushotham Raj. Ground Improvement Techniques, Laxmi Publications, New Delhi / University science press, New Delhi

Reference Books:

1. Moseley M.P. (1993) Ground Improvement, Blackie Academicand Professional, Boca Taton, Florida, USA.
2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) Ground Control and Improvement, John Wiley and Sons, New York, USA
3. Robert M. Koerner, Designing with Geosynthetics, Prentice Hall New Jercy, USA
4. Current Practices in Geotechnical Engineering Vol.-I, Alam Singh and Joshi, International Book Traders, 1985.
5. Construction and Geotechnical methods in Foundation Engineering by R.M.Koerner, McGraw-Hill , 1984.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Describe dewatering techniques according to field conditions	L1
2. Identify different grout materials and apply various grouting methods	L3
3. Explain various in situ densification methods for granular and cohesive soils	L3
4. Describe applications of geo-synthetics and methods of soil stabilization.	L3
5. Demonstrate basic knowledge about design principles of reinforced soil walls	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17KT.1	2	3	-	-	1	-	-	-	-	-	-	-	-	-	-
20A17KT.2	3	3	-	3	2	-	-	1	-	-	-	-	-	-	-
20A17KT.3	2	1	-	2	2	-	-	1	-	-		2	-	-	-
20A17KT.4	2	1	-	2	2	1	-	-	-	-	-	2	-	-	-
20A17KT.5	2	-	1	3	3	-	-	2	-	-	-	2	-	-	-

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

Title of the Course	Air Pollution and Control Engineering
Category	PEC
Course Code	20A17LT
Year	IV B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To understanding of the concepts behind a range of Ground Improvement Techniques, and be able to identify appropriate techniques for a range of ground and site conditions.
- Learn many ground improvement techniques including vibro flotation and preloading including sand drains
- To get familiarize about different methods of ground improvement in cohesive and granular soil.
- To get knowledge on expansive soils, ground improvement techniques, reinforced earth retaining structures, drainage and dewatering and grouting techniques.
- To understand the expansive soil properties and apply the same for the design of structures on expansive soils.

Unit 1 Introduction **8**

Air Pollution – Definitions, Scope, Significance andEpisodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non- Point, Line and Areal Sources of air pollution- stationary and mobile sources.

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

- Explain about Air Pollutants (L1)
- Discuss the Areal Sources of air pollution (L1)
- Explain stationary and mobile sources (L1)

Unit 2 Effects of Air Pollution **10**

Effects of Air pollutants on man,material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

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

- Explain Effects of Air pollutants on man,material (L3)
- Explain Global effects of air pollution (L1)

Unit 3 Thermodynamic of Air Pollution **10**

Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like Sox, Nox, CO, HC etc., air-fuel ratio. Computation and Control of products of combustion.

Plume Behaviour Meteorology and plume Dispersion; propertiesof atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-windrose diagrams.

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

- Explains Applications in the removal of gases like Sox, Nox, CO, HC etc (L3)
- Discuss the Influence of Meteorological phenomena on Air Quality (L3)

Unit 4 Pollutant Dispersion Models: **10**

Lapse Rates, Pressure Systems, Winds and moisture plume behavior and plume Rise Models; Gaussian Model for Plume Dispersion.

Control of Particulates: Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control, Equipment‘s – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

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

- Explain about Winds and moisture plume behavior and plume Rise Models (L3)
- Explain importance of Control of particulates (L3)

Unit 5 Control of Gaseous Pollutants **10**

General Methods of Control of NO_2 and SO_2 emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

Air Quality Management : Air Quality Management –Monitoring of SPM, SO; NO and CO Emission Standards

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

- Explain importance of In-plant Control Measures (L3)
- Explain importance of Air Quality Management (L4)

Prescribed Text Books:

1. Air Quality by Thod godish, Levis Publishers, Special India Edition, New Delhi
2. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
3. Air pollution by Wark and Warner.- Harper & Row, New York

Reference Books:

1. An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications.
2. Air Pollution and Control by K.V.S.G.Murali Krishna, Kousal & Co. Publications, New Delhi.
3. Enivronmental meteorology by S.Padmanabham murthy ,I.K.Internationals Pvt Ltd,New Delhi.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Explain about Air Pollutants, discuss the Areal Sources of air pollution and explain stationary and mobile sources	L1
2. Explain effects of Air pollutants on man, material and Global effects of air pollution	L1, L3
3. Explains applications in the removal of gases like Sox, Nox, CO, HC etc, and discuss the Influence of Meteorological phenomena on Air Quality	L3
4. Explain about Winds and moisture plume behavior and plume Rise Models and explain importance of Control of particulates	L3
5. Explain importance of In-plant Control Measures and explain importance of Air Quality Management	L3, L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17LT.1	2	2	-	2	2	2	2	-	-	-	-	-	-	-	-
20A17LT.2	2	-	2	3	-	2	3	-	-	-	-	2	-	-	-
20A17LT.3	3	2	2	2	-	2	2	-	-	-	-	2	-	-	-
20A17LT.4	2	-	-	2	-	3	2	-	-	-	-	2	-	-	-
20A17LT.5	3	2	-	2	-	2	-	-	-	-	-	3	-	-	-

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

Title of the Course	Disaster Management
Category	OEC
Course Code	20A17MT
Year	IV B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To enable the learner to understand how disasters occur and keep them aware about different disasters.
- To enable students to plan measures against different disasters.
- To make students familiar with the topics of crisis, disaster and emergency management techniques.

Unit 1 Introduction to disasters and Natural Disasters 9

Definitions Of Risk, Vulnerability and Disasters and Their Relationship; Classification of Disasters; Natural Disasters; Environmental; Floods: Urban Floods; Flash Floods; Cyclones; Earthquakes; Landslides; Avalanches; Mudslides Impacts of Natural Disasters; Important Case Studies (2006 Tsunami, Covid 19 etc.,).

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

- Various natural disasters and what their preconditions. (L1)
- Impacts of different natural disasters on different aspects of human life. (L1)

Unit 2 Manmade Disaster 10

Classification of Manmade Disasters: Preconditions Various Manmade Disasters; Impacts of Manmade Disasters; Important Case Studies (Bhopal Gas Tragedy, Fukushima Disaster, Ennore Oil Spill, Vizag Styrene Leak).

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

- Discern between natural and manmade disasters (L1)
- Learn about cascading disasters (L1)
- Find the reasons why manmade disasters happen and how to avert them. (L1)

Unit 3 Crisis and Emergency Management 8

Definition, scope and methods of - Crisis Management, Emergency management; Importance of emergency management

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

- Understand the importance of crisis and emergency management. (L4)
- Understand how evacuation drills are conducted and their importance. (L4)
- Devise plans for industrial monitoring and analyse various real-time disasters. (L1)

Unit 4 Disaster Risk Reduction 12

Global and national disaster trends, Common Disasters in India, Disaster management cycle–its phases; prevention, mitigation, preparedness, relief and recovery; structural and nonstructural safety and rehabilitation measures; Roles and responsibilities of government. DRR programs in India and the activities of National Disaster Management Authority.

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

- Understand various phases in disaster management and importance of decision making (L3)
- Learn relating risk, vulnerability and capacity. (L3)
- Know various stages involved in disaster management and various disaster management authourities (L3)

Unit 5 Rehabilitation and Reconstruction 8

Post disaster situations; Rebuilding – methods and strategies; Re-development - Methods and strategies; Environmental

design; Disaster resistant design in built environment and in industries. Change in land use pattern and its effects on human settlements. Capacity building of the society and the industries against disasters.

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

- Understand and analyse dealing with post disaster situations. (L3)
- Learn the importance of incorporating environment in the design. (L3)
- Methods and strategies involved in rebuilding the society. (L3)

Prescribed Text Books:

1. Disaster Management, Dr. Mrinalini Pandey, 2014, Wiley India.
2. Introduction to Emergency Management, Bullock et al., 2020, Elsevier.
3. Techniques for Disaster Risk Management and Mitigation, Mohanty et al., 2020, Wiley.

Reference Books:

1. Harsh K Gupta, Disaster Management, 2003, Universities Press.
2. Larry Collins, Disaster Management and Preparedness, 2001, Lewis Publishers.
3. Li et al., Geomatics Solutions for Disaster Management, 2007, Springer International.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Know about various natural disasters and what their preconditions and impacts of different natural disasters on human life.	L1
2. Learn about cascading disasters and to find the reasons why manmade disasters happen and how to avert them.	L1
3. Understand how evacuation drills are conducted and their importance, devise plans for industrial monitoring and analyse various real-time disasters.	L1, L4
4. Learn relating risk, vulnerability and capacity and to know about various stages involved in disaster management and various disaster management authorities.	L3
5. Understand and analyse the dealing with post disaster situations and methods and strategies involved in rebuilding the society	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17MT.1	-	1	-	-	-	1	1	1	1	-	-	1	-	-	1
20A17MT.2	-	1	-	-	-	1	1	1	1	-	-	1	-	-	1
20A17MT.3	-	1	1	1	1	1	1	-	-	-	-	-	1	1	-
20A17MT.4	-	-	-	1	1	1	1	-	-	-	-	-	1	1	-
20A17MT.5	1	1	1	1	-	-	1	1	-	1	-	-	1	1	-

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

Title of the Course	Instrumentation and Sensor Technologies
Category	OEC
Course Code	20A17NT
Year	IV B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- Understand instrumentation, sensor theory and technology, data acquisition, digital signal processing, damage detection algorithm, life time analysis and decision making
- This course introduces theoretical and practical principles of design of sensor systems.
- Cover the principles of state-of-the-art systems being used in physical infrastructure/bridges/buildings/pavements, etc.
- Providing principal knowledge, practical training and measurement best practice for a range of temperature, pressure, electrical, velocity, acceleration and vibration systems.

Unit 1 Fundamentals of Measurement, Sensing and Instrumentation. 8

Definition of measurement and instrumentation, physical variables, common types of sensors; Describe the function of these sensors; Use appropriate terminology to discuss sensor applications; and qualitatively interpret signals from a known sensor type, types of instrumentation, Sensor Specifics, Permanent installations, Temporary installations.

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

- Understand different types of sensors and its functions, applications (L1)
- Understand types of instrumentation and installation of sensors. (L1)

Unit 2 Sensor Installation and Operation covering 8

Predict the response of sensors to various inputs; ii) Construct a conceptual instrumentation and monitoring program; iii) Describe the order and methodology for sensor installation; and iv) Differentiate between types of sensors and their modes of operation and measurement and v) Approach to Planning Monitoring Programs,

Define target, Sensor selection, Sensor siting, Sensor Installation & Configuration, Advanced topic, Sensor design, Measurement uncertainty.

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

- Understand applications and limitations of sensors and instruments. (L2)
- Understand the principles of operation and characteristics of instrumentation and integrated sensor systems. (L2)

Unit 3 Data Analysis and Interpretation 8

Fundamental statistical concepts, b) Data reduction and interpretation, c) Piezometer, Inclinometer, Strain gauge, etc. d) Time domain signal processing, e) Discrete signals, Signals and noise and f) a few examples of statistical information to calculate are: Average value (mean), On average, how much each measurement deviates from the

mean (standard deviation), Midpoint between the lowest and highest value of the set (median), Most frequently occurring value (mode), Span of values over which your data set occurs (range)

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

- Understand fundamental statistical concepts (L1)
- Understand statistical data analysis and techniques (L1)

Unit 4 Frequency Domain Signal Processing and Analysis covering 8

Explain the need for frequency domain analysis and its principles; Draw conclusions about physical processes based on analysis of sensor data; Combine signals in a meaningful way to gain deeper insight into physical phenomena, Basic concepts in frequency domain signal processing and analysis, Fourier Transform, FFT (Fast Fourier Transform), Example problems: Noise reduction with filters, Leakage, Frequency resolution.

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

- Understand frequency domain analysis and its principles (L3)
- Understand how to draw conclusions (L3)

Unit 5 Flow Measurements 6

Primary methods- Ultrasonic flow meter-electro magnetic flow meter, turbine flow meter, lobbed impeller meter, rotary vane flow meter- working principal and its applications.

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

- Understand different flow measuring devices (L3)
- Understand the working principal of flow measuring devices and its application (L3)

Prescribed Text Books:

1. Alan S Morris (2001), Measurement and Instrumentation Principles, 3rd/e, Butterworth Hienemann.
2. David A. Bell (2007), Electronic Instrumentation and Measurements 2nd/e, Oxford Press.

Reference Books:

1. S. Tumanski (2006), Principle of Electrical Measurement, Taylor & Francis.
2. Ilya Gertsbakh (2010), Measurement Theory for Engineers, Springer.

Course Outcomes:

At the end of the course, the student will be able	Blooms Level of Learning
1. To specify the requirements in the calibration of sensors and instruments	L1
2. To describe the requirements during the transmission of measured signals	L2
3. To specify the requirements in the calibration of sensors and instruments	L1
4. To construct Instrumentation/Computer Networks	L3
5. To analyze different flow measurement techniques.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17NT.1	1	-	2	-	-	-	-	-	-	-	-	-	2		2
20A17NT.2	1	-	2	-	-	-	-	-	-	-	-	-	-	2	2
20A17NT.3	1	-	2	-	-	-	-	-	-	-	-	1	-	2	2
20A17NT.4	1	-	2	-	-	-	-	-	-	-	-	1	-	-	2
20A17NT.5	-	-		-	-	-	-	-	-	-	-		1	-	2

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

Title of the Course	Watershed Management
Category	OEC
Course Code	20A17OT
Year	IV B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To understand different watershed behavior
- To interpret runoff data and quantify erosion by using various modeling methods.
- To understand land use classification and impact of land use changes on hydrological Cycle.

Unit 1 Introduction **8**

Introduction,- concept of watershed, need for watershed management, concept of sustainable Development. Hydrology of small watersheds

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

- understand the concepts of watershed management. (L1)
- Understand the sustainable development of water resources (L1)
- Learn the concepts of Hydrology of small watersheds (L2)

Unit 2 Soil Erosion and Control Measures **13**

Principles of soil erosion- causes of soil erosion, types of soil erosion, estimation of soil Erosion from small watersheds, Control of soil erosion, methods of soil conservation –Structural and non-structural measures.

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

- understand the causes of soil erosion (L4)
- The student can learn the measures for control of soil erosion (L4)
- Also learn the conservation measures (L5)

Unit 3 Water Harvesting Methods **10**

Principles of water harvesting, methods of rainwater harvesting, design of rainwater Harvesting structures.

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

- Design of rainwater harvesting structures (L5)
- Learn water conservation during the water scarcity and less rainfall (L5)

Unit 4 Groundwater Recharge **6**

Artificial recharge of groundwater in small watersheds-, methods of artificial recharge.

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

- understand the importance of artificial recharge of ground water (L4)
- The student learns what are the various methods of artificial recharge of groundwater (L4)
- Importance of groundwater recharge in case of low availability of surface water (L4)
- Student can learn the alternative usage of ground water in case of scarcity of surface water (L4)

Unit 5 Reclamation of Saline Soils **8**

Reclamation of saline soils -. Micro farming -, biomass management on the farm.

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

- reclaim the saline soils by using various reclamation methods (L4)
- The student can learn the importance of micro farming (L4)
- At the end of the chapter he could understand the various biomass management of farming (L4)

Prescribed Text Books:

1. Murthy, V.V.N. and M.K. Jha Land and Water Management, Kalyani Publishers,2015
2. Watershed Management by Madan Mohan Das and M.D. Saikia, Prentice Hall ofIndia, 2013
3. Watershed Management Muthy, J. V. S., , New Age International Publishers, 1998

Reference Books:

1. Watershed Hydrology by P E Black, Prentice Hall Englewood Cliffs, 1991
2. Watershed Hydrology by R Suresh, Standard Publishers and Distributors, Delhi, 2007

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand about watershed concept	L1
2. Plan and design soil conservation measures in a watershed	L4 & L5
3. Plan and design water harvesting	L5
4. Artificial Recharge of Groundwater structures in small watersheds	L4
5. Plan measures for reclamation of saline soils	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17OT.1	-	2	3	3	-	-	-	-	-	-	-	2	2	3	3
20A17OT.2	-	2	3	3	-	-	-	-	-	-	-	2	2	2	3
20A17OT.3	-	2	3	3	-	-	-	-	-	-	-	2	2	2	3
20A17OT.4	-	2	3	3	-	-	-	-	-	-	-	2	2	2	3
20A17OT.5	-	2	3	3	-	-	-	-	-	-	-	2	2	2	3

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

Title of the Course	Occupational Health, Safety and Environmental Management
Category	OEC
Course Code	20A17PT
Year	IV B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To familiarize students about the occupational hazards and remedial measures to say safe at work place.
- To enable students to learn the basics of the environmental management in order to make them job ready.

Unit 1 Occupational Health 9

Risk, Safety, Hazard, Occupational Hazard and Control Principles: National Safety Policy, Occupational safety and Health Act (OSHA), Laws governing OSHA and right to know. Accident-causes and Effects, roles and responsibilities of workers, managers and supervisors in reduction of Occupational Hazards; Ergonomics at Work Place. Common Occupational diseases. Radiation, Noise and Vibration, Fire and other Hazard, Industrial Lighting & Illumination.

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

- Identify accident prone areas and adopt methods for reducing accidents following safety precautions. (L4)
- Identify and apply safety policy in an industry and List out the duties and implement Safety Targets, Objectives, Standards, Practices and Performances. (L3)

Unit 2 Workplace Safety 10

Health Considerations at Work Place: types of diseases and their spread, Health Emergency. Personal Protective Equipment (PPE)- Need for personal protection equipment, selection, applicable standards, and supply, use, care &maintenance respiratory and non-respiratory personal protective equipment, effects of exposure and treatment for engineering industries, Toxicity, Lethal dosage calculation, chronic hazardous material absorption.

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

- Prepare profile with an appropriate accuracy as per safety precaution in workshop. (L4)
- Identify causes of fire, techniques of fire extinguishing methods and other hazards (L3)

Unit 3 Safety Legislations 10

Bureau of Indian standards on safety and health 14489 - 1998 and 15001 – 2000, OSHA, Process Safety Management (PSM) as per OSHA, PSM principles, OHSAS – 18001, EPA Standards, Performance measurements to determine effectiveness of PSM. Benefits of certification-certification procedure – OH & S management system element, specification and scope - correspondence between OHSAS 18001, ISO 14001:1996 and ISO 9001:1994 – Guidelines (18002:2000) for implementing OHSAS 18001.

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

- Know about the bureau of Indian Standards on safety and health. (L3)
- Know about the safety management as per OSHA and benefits of certifications and certification procedures. (L4)

Unit 4 Environment and pollution 8

Anthropological events, Industries and pollution; EIA Definition, Need and Importance; types of pollution (air, water, noise and soil); methods of pollution abatement (Air, soil and water) Pollution control boards, Legislations

pertaining to environment protection in India. Environmental indicators, API air pollution; WQI; ambient air quality standards.

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

- Learn about the industrial pollutions like air, water, noise and soil pollutions. (L4)
- Learn about the protection of environment and quality standards. (L3)

Unit 5 Environmental Management 12

Definition, importance and need of EM; Steps involved in EM; Environmental Auditing; Minimum green cover for industries; Environmental clearance; NGT, MOEFCC; ISO 14001, Requirements, process involved in ISO 14001.

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

- To know about the environmental clearance and process involved as per ISO 14001 (L4)
- Know about the need of environmental management and minimum green cover industries. (L3)

Prescribed Text Books:

1. R. K. Jain and Sunil S. Rao, Industrial Safety, Health and Environment Management Systems, Khanna publishers, New Delhi (2006)
2. R Ajith Sankar, Environmental management, Oxford University Publishers, 2015.
3. Air pollution by M N Rao and HVN Rao.

Reference Books:

1. Occupational Health Management 1st Edition 2015 by R.K. Mishra
2. Occupational Safety Health & Environment Sustainable Economic Development Chaturvedi Pradeep

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Remembering about accident causes and their responsibilities	L4
2. Understand the concept of types of diseases and their spread	L3
3. Learn to maximize the Process Safety Management (PSM) as per OSHA.	L4
4. Learn how to protect the environment from pollution.	L4
5. Understand the importance of Minimum green cover for industries, Environmental clearance.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17PT.1	-	1	2	-	-	-	3	-	-	-	-	1	-	1	1
20A17PT.2	-	1	1	-	-	-	1	-	-	-	-	1	-	1	-
20A17PT.3	-	1	1	-	-	-	1	-	-	-	-	1	-	1	-
20A17PT.4	-	1	1	-	-	-	1	-	-	-	-	1	-	1	-
20A17PT.5	-	1	1	-	-	-	1	-	-	-	-	1	-	1	-

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

Title of the Course	Project Management Lab
Category	SC
Course Code	20A171L
Year	IV B. Tech.
Semester	I Semester
Branch	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives: This course aims at

- Provides deep insight in to the importance of project planning in the software industry.
- Learn the MS Project tool employed, which makes the process of project planning easy to implement.

List of Experiments **40**

1.Creat project plan
   a. Specify project name and start and finish date
   b. Define project tasks
   c. Define duration for each task
   d. Define milestones in plan
   e. Define dependency between tasks
   f. Project calendar
   g. Project resources
   h. Specify resources type and rates
   i. Assign resources against each task
   j. Base line the project plan.

2.Execute and Monitor project plan
   a. Update % complete with current task status
   b. Review the status of each task
   c. Compare planned Vs actual status
   d. Review the status of critical path
   e. Review resources assignation status

3.Generate dashboard
   a. Project and cost Overview
   b. Upcoming tasks

4.Generate resource reports
   a. Over allocated resources
   b. Resources overview

5.Generate cost reports
   a. Earned value reports
   b. Resource cost overview
   c. Task cost overview

6.Generate r progress reports
   a. Critical Tasks
   b. Milestone Reports
   c. Slipping Tasks

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Plan and manage projects	L2
2. Consolidate and communicate information about the project	L2
3. Manage resources, assignments, work allocation and generate report to assess project status.	L3
4. Able to create Gantt and PERT charts	L3
5. Identify factors affecting critical path	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A171L.1	-	-	-	-	-	1	-	-	-	-	2	-	2	-	2
20A171L.2	-	-	-	-	-	1	-	-	-	-	1	-	-	2	2
20A171L.3	-	-	-	-	-	1	-	-	-	3	2	-	-	2	2
20A171L.4	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-
20A171L.5	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Humanities and Sciences
(Can also be handled by the faculty members of other departments who underwent FDP on UHV conducted by AICTE, New Delhi)

Title of the Course	Universal Human Values-II
Category	HS
Course Code	20AC71T
Year	IV B. Tech
Semester	I Semester
Branch	Common to all

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives:
- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection
- Development of commitment and courage to act

Unit 1 Course Introduction - Need, Basic Guidelines, Content and Process for Value Education 6
- Purpose and motivation for the course, recapitulation from Universal Human Values-I
- Self-Exploration–what is it? - Its content and process;
- 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario
- Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

Unit 2 Understanding Harmony in the Human Being - Harmony in Myself! 6
- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of 'I' and harmony in 'I'
- Understanding the harmony of I with the Body
- Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
- Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss programs for ensuring health vs dealing with disease.

Unit 3 Understanding Harmony in the Family and Society - Harmony in Human – Human Relationship 6
- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence

- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education, etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

Unit 4 Understanding Harmony in the Nature and Existence -Whole existence as Coexistence 6

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all pervasive space
- Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology, etc.

Unit 5 Implications of the above Holistic Understanding of Harmony on Professional Ethics 6

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics: a). Ability to utilize the professional competence for augmenting universal human order b). Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c). Ability to identify and develop appropriate technologies and management patterns for the above production systems.
- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order: a). At the level of individual: as socially and ecologically responsible engineers, technologists and managers b). At the level of society: as mutually enriching institutions and organizations
- Summing up.

Include practice Exercises and Case Studies (tutorial) Sessions e.g., to discuss the conduct of an engineer or a scientist, etc.

Prescribed Textbooks

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar Kantak, 1999.
2. N. Tripathi, Human Values", New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi. The Story of My Experiments with Truth
5. E. FSchumacher. Small is Beautiful
6. Cecile Andrews, Slow is Beautiful
7. J C Kumarappa. Economy of Permanence
8. Pandit Sunderlal. Bharat Mein Angreji Raj
9. Dharampal, Rediscovering India.
10. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule"
11. Maulana Abdul Kalam Azad. India Wins Freedom
12. Romain Rolland. Vivekananda (English)
13. Romain Rolland. Gandhi (English)
14. Jawaharlal Nehru. Rediscovery of India

Course Outcomes:

Upon successful completion of the course, student will	Blooms Level of Learning
1. become more aware of themselves, and their surroundings (family, society, nature)	L2
2. become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.	L2
3. have better critical ability.	L3
4. become sensitive to their commitment towards what they have understood (human values, human relationship and human society).	L3
5. apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.	L4

CO-PO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC71T.1	-	-	-	-	-	-	-	-	-	-	-	3
20AC71T.2	-	-	-	-	-	-	-	-	-	-	-	3
20AC71T.3	-	-	-	-	-	-	-	-	-	-	-	3
20AC71T.4	-	-	-	-	-	-	-	-	-	-	-	3
20AC71T.5	-	-	-	-	-	-	-	-	-	-	-	3

Assessment pattern for UHV-2

The Assessment Pattern for Universal Human Values-II course is described hereunder.

UHV-2 course carries two credits. The assessment is to provide a fair state of development of the student, so participation in classroom discussions, self-assessment, peer assessment etc. will be used in evaluation.

A student has to secure 40% marks out of 100 in the CIE and SEE together to qualify for the award of the degree. The distribution shall be 50 marks for continuous internal assessment and 50 marks for semester end examination.

Internal evaluation shall be conducted for the course during semester and shall be evaluated for 50 marks and distributions of marks as follows:

- Assessment by faculty mentor: 10 marks
- Self-assessment: 10 marks
- Assessment by peers: 10 marks
- Socially relevant project/ Group Activities/Assignments: 20 marks

Semester End examination is conducted for 50 marks and is of 2 hours duration. The question paper shall be of subjective type with 5 questions, one question from each unit, with internal choice. All the questions carry equal marks of 10 each.