

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES

RAJAMEPT - 516126

(AUTONOMOUS)

www.aitsrajampet.ac.in



DEPARTMENT OF CIVIL ENGINEERING

ACADEMIC REGULATIONS (R15)

AND

COURSE STRUCTURE & SYLLABI

For the students admitted to
B. Tech., Regular Four Year Degree Programme in CBCS
from the Academic Year 2015-16

and

B. Tech., Lateral Entry Scheme from the Academic Year 2016-17



B. TECH., CIVIL ENGINEERING

VISION AND MISSION OF THE INSTITUTION

Vision

We impart futuristic technical education and instill 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.

VISION AND MISSION OF THE DEPARTMENT

Vision

The department of civil engineering strives to help its graduates to become technically sound and ethically strong engineers and to be recognized as one of the best civil engineering program's in the country through its pursuit of excellence in teaching, research and service activities, besides imparting basic knowledge.

Mission

- To impart training to the students in order to make themselves suitable for the changing technologies in civil engineering field.
- To provide an environment which inspires the students to enhance their analytical thinking and creativity to solve the problems of rural public and problems of the world related to civil engineering.
- To nurture leadership and team work in the students so as to make them good leaders, entrepreneurs and responsible citizens.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The following program educational objectives are consistent with the college and department missions. Graduates of our Civil Engineering program are expected within a four years of graduation to have:

- PEO 1. To apply a broad, fundamental-based knowledge and up-to-date skills required in performing professional work in Civil Engineering and related disciplines.
- PEO 2. To design the works pertaining to Civil Engineering, incorporating the use of design standards, realistic constraints and consideration of the economic, environmental, and social impact of the design.
- PEO 3. To use modern computer software tools to solve Civil Engineering problems and explain and defend their solutions and communicate effectively using graphic, verbal and written techniques to all audiences and
- PEO 4. To demonstrate their ability to deal effectively with ethical and professional issues, taking into account the broader societal implications of civil engineering.

PROGRAMME OUTCOMES (POs)

- a. An ability to demonstrate basic knowledge in mathematics, science and engineering.
- b. An ability to design and conduct experiments, interpret analyzed data and report results.
- c. An ability to design a civil system that meet desired specifications and requirements.
- d. An ability to function on engineering and science laboratory teams, as well as on multidisciplinary design teams.
- e. An ability to identify, formulate and solve civil engineering problems.
- f. An ability to understand of their professional and ethical responsibilities.
- g. An ability to communicate effectively in both verbal and written forms.
- h. Confidence to apply engineering solutions in global and societal contexts.
- i. Capability of self-education and clearly understanding the value of lifelong learning.
- j. Broad scene education and will have an understanding of the impact of engineering on society and demonstrate awareness of contemporary issues.
- k. With modern engineering software tools and equipment to analyze civil engineering problems.
- l. An ability to use the techniques, skills and modern simulation software necessary for mechanical engineering practice.
- m. Knowledge of contemporary issues.
- n. An ability to function on multi-disciplinary teams.

Index

| Serial Number | Description | Page Number |
|---------------|--------------------------------------|-------------|
| 1 | Academic Regulations | 5 |
| 2 | Curriculum Structure | 15 |

ACADEMIC REGULATIONS

B. Tech, Four Year Degree Programme with CBCS
(For the batches admitted from the academic year 2015-16)
and
B. Tech. Lateral Entry Scheme
(For the batches admitted from the academic year 2016-17)

The following rules and regulations will be applicable for the batches of Four year B. Tech. degree admitted from the academic year 2015-16 onwards.

1. ADMISSION:

1.1 Admission into First year of Four year B. Tech. Degree programme of study in Engineering:

As per the existing stipulations of Andhra Pradesh State Council of Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made into the first year of four year B. Tech. Degree programme as per the following pattern.

a) Category-A seats will be filled by the Convener, AP-EAMCET.

1.2 Category-B seats will be filled by the Management as per the norms stipulated by Govt. of Andhra Pradesh. Admission into the Second Year of Three year B.Tech. Degree programme (lateral entry).

b) As per the existing stipulations of Andhra Pradesh State Council of Higher Education (APSCHE), Government of Andhra Pradesh. Seats will be filled by the Convener, AP-ECET.

2. PROGRAMMES OF STUDY OFFERED BY AITS LEADING TO THE AWARD OF B.Tech DEGREE:

Following are the four year Under Graduate Degree Programmes of study offered in various disciplines at Annamacharya Institute of Technology and Sciences, Rajampet leading to the award of B.Tech. (Bachelor of Technology) Degree:

1. B.Tech. (Computer Science and Engineering)
2. B.Tech. (Electrical and Electronics Engineering)
3. B.Tech. (Electronics and Communication Engineering)
4. B. Tech. (Information Technology)
5. B.Tech. (Mechanical Engineering)
6. B.Tech. (Civil Engineering)

and any other programme as approved by the concerned authorities from time to time.

3. ACADEMIC YEAR:

The entire course of study is of four academic years and each year will have **TWO** Semesters (Total **EIGHT** Semesters). The minimum instruction days for each semester shall be 90.

4. COURSE STRUCTURE:

Each programme of study shall consist of:

4.1 General Courses comprising of the following : (5 to 10%)

- a) Language / Communication Skills
- b) Humanities and Social Sciences : Environmental Science
- c) Economics and Accounting
- d) Principles of Management

4.2 Basic Science Courses comprising of the following: (15 to 20%)

- a) Computer Literacy with Numerical Analysis
- b) Mathematics
- c) Physics
- d) Chemistry

4.3 Basic Engineering Courses comprising of the following (depending on the branch): (15 to 20%)

- a) Engineering Drawing
- b) Engineering and IT Workshop
- c) Engineering Mechanics
- d) Basic Mechanical Engineering
- e) Electrical and Electronics Engineering
- f) Basic Civil Engineering
- g) Computer Programming

4.4 Compulsory Discipline Courses: (30 to 40%)

The lists of professional subjects are chosen as per the suggestions of the experts, to impart broad based knowledge needed in the concerned branch of study.

4.5 Professional subjects - Electives: (10 to 15%)

Electives will be offered to the students to diversify the spectrum of knowledge, based on the interest of the student to broaden his individual skill and knowledge.

4.6 Open Electives: (5 to 10%)

Open subjects will be offered from other technical and / or emerging subject areas

4.7 Project work, Seminar and / or Internship: (10-15%)

Project work, seminar and /or internship in industry or elsewhere.

4.8 Mandatory courses:

Environmental Studies, Technical English and Technical Communication & Soft Skills are included as subjects under mandatory courses but with credit weightage.

4.9 There shall be a subject like comprehensive Civil Engineering with 2 hours per week introduced in final year first semester.

4.10 Every programme of study shall be designed to have 42 - 44 theory courses and 19 - 22 laboratory/seminar/comprehensive courses.

4.11 Every programme has included foundation courses to the extent of 30%, programme core and programme elective subjects to the extent of 60%, open electives and mandatory courses to the tune of 10% approximately of the total credits.

4.12 Audit Courses (to be included in III B.Tech. I Sem & II Sem):

Interested students who want to supplement their knowledge can opt for audit courses namely Professional Ethics/Stress Management & Advanced English Communication Skills Laboratory and can appear/pass in Continuous Internal Evaluation and Semester End Examination of these courses, will be included in marks memo only when they pass.

4.13 Open Elective

IV Year I Semester student has to necessarily select a subject from the list of open electives.

4.14 Contact Hours: Depending on the complexity and volume of the course, the number of contact hours per week will be assigned.

5. CREDIT SYSTEM:

Credits are assigned based on the following norms.

| | Semester Pattern | |
|----------------------|------------------|-----------|
| | Period(s) / Week | Credit(s) |
| Theory | 01 | 01 |
| Practical | 3 | 02 |
| Comprehensive Course | 02 | 02 |
| Seminar | – | 02 |
| Final Year Project | 12 | 08 |

6. EXAMINATION SYSTEM: All components in any programme of study will be evaluated continuously through internal evaluation and an external evaluation component conducted as semester-end examination.

6.1 Distribution of Marks:

| S. No. | Description | Marks | Examination and Evaluation | Scheme of Evaluation |
|--------|-------------|-------|---|---|
| 1 | Theory | 70 | Semester-End Examination. | The question paper shall be of subjective type with Five questions with internal choice to be answered in 180 Minutes duration. |
| | | 30 | <p>Mid-Examinations of 120 Minutes duration to be evaluated for 20 marks.</p> <p>The question paper shall be of subjective type in which four questions with an internal choice are to be answered.</p> <p>Remaining 10 marks is for continuous evaluation which includes weekly/ fortnightly class tests, homework assignments, problem solving, group discussions, quiz, seminar, mini-project and other means.</p> <p>The method of allotting these marks will be decided by the teacher dealing that subject in consultation with the Head of the Department. Teacher has to announce the evaluation method in the beginning of the semester.</p> | <p>Two MID - Examinations are to be conducted for 20 marks each in a semester. 80% weightage for better performance and 20% for other shall be considered.</p> <p>MID-I: after first spell of instructions(I & II-Units).</p> <p>MID-II: after second spell of instructions(III,IV&V-Units).</p> <p>The student who has missed both the Mid examinations will be permitted to appear for a substitute examination covering the total syllabus. This substitute examination will be given a weightage of 80%. This is to be conducted before the commencement of end semester exams, can be even outside the working hours, can be even two mid exams a day also.</p> |

| S. No. | Description | Marks | Examination and Evaluation | Scheme of Evaluation |
|--------|-----------------------|-------|---|--|
| 2 | Laboratory or Drawing | 70 | Semester - End Lab Examination | For laboratory courses: 180 minutes duration – two examiners. For Drawing and / or Design: like for the theory examination. |
| | | 30 | 20 Marks for Day to Day evaluation | Performance in laboratory experiments |
| | | | 10 Marks for Internal evaluation | Performance of one best out of two tests to be considered. |
| 3 | Seminar | 100 | Internal Evaluation- 20 Marks for Report 20 Marks for subject content 40 Marks for presentation 20 Marks for Question and Answers | Continuous evaluation during a semester by the Departmental Committee (DC) consisting of two / three faculty members allotted by Head of the Department. |
| 4 | Comprehensive Course | 100 | The marks can be allotted based on the performance in viva-voce conducted by Head of the department and two senior faculty members in the department. | |
| 5 | Project Work | 100 | 70 Marks for External evaluation | Semester-End Project Viva-Voce Examination by Committee as detailed under 6.2 |
| | | | 30 Marks for Internal evaluation | Continuous evaluation by the DC 15 Marks by DC as detailed under 6.2.1 15 Marks by Supervisor |

6.2 Project Work Evaluation:

- 6.2.1 The Internal Evaluation shall be made by the Departmental Committee, on the basis of average of two seminars presented by each student on the topic of his project, the best one to be considered. The presentations shall be evaluated by the Departmental Committee (DC) consisting of Head of the Department, supervisor and a senior faculty member.
- 6.2.2 The Semester-End Examination (viva-voce) shall be conducted by a Committee consisting of External Examiner nominated by the Chief Controller of Examinations, HOD and Supervisor. The evaluation of project work shall be conducted at the end of the IV year II Semester.

6.3 Eligibility to appear for the Semester-End examination:

- 6.3.1 A student shall be eligible to appear for end examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects in the semester.
- 6.3.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the Institute Academic Committee if the reason for shortage is convincing.
- 6.3.3 Shortage of Attendance below 65% in aggregate shall in no case be condoned.
- 6.3.4 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.
- 6.3.5 Students whose shortage of attendance is not condoned in any semester are not eligible to take their End examination of that class and their registration for that semester shall stand cancelled.
- 6.3.6 A student will not be promoted to the next semester unless he satisfies the attendance requirements of the current semester, as applicable.
- 6.3.7 A student detained due to shortage of attendance, will have to repeat that semester when offered next.

6.4 Revaluation / Recounting:

Students shall be permitted to request for recounting / revaluation of the end theory examination answer scripts within a stipulated period after payment of prescribed fee.

After recounting or 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 letter or a notice.

6.5 Improvement of Marks:

Students are permitted for improvement examinations once for a maximum of four subjects after completion of the study course but before applying for provisional certificate and consolidated marks memo after payment of prescribed fee.

6.6 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.

6.7 Supplementary Examination:

- a) All Regular examinations are understood as Regular/Supplementary examinations. The supplementary students have to appear for the supplementary examinations along with their regular examinations conducted at the end of each semester. However, separate supplementary examinations will be conducted for the II-Semester subjects at the end of I-Semester and vice-versa.
- b) 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 available. If the next batch of students is not available, a separate supplementary examination will be conducted.

6.8 Supplementary Examination:

All Regular examinations are understood as Regular / Supplementary examinations. The supplementary students have to appear for the supplementary examinations along with their regular examinations conducted at the end of each semester. However, separate supplementary examinations will be conducted for the II-Semester subjects at the end of I-Semester and vice-versa.

6.9 Internship Programme:

The weightage of two credits given for an internship of three weeks duration and more, when a student undergoes internship / industrial training from the Specified Industries / Research Organizations / Universities. In such a case, the student has to submit a report on that internship which will be evaluated by a team of three faculty members (decided by the HOD) of the department for those two credits. Student is given a chance to drop one seminar in place of a successful internship / industrial training.

6.10 Massive Open Online Course (MOOC):

MOOC is one of the courses introduced in IV year II semester. The list of subjects under MOOC will be intimated before commencement of class work.

7. ACADEMIC REQUIREMENTS FOR PROMOTION / COMPLETION OF B.TECH PROGRAMME OF STUDY:

The following academic requirements have to be satisfied in addition to the attendance requirements for promotion/ completion of B.Tech. Programme of study.

7.1 For students admitted into B.Tech. (Four Year) programme:

- 7.1.1 A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical, drawing subject if he secures not less than 35% of marks in the End Examination and a minimum of 40% of marks in the sum total of the Internal Evaluation and End Examination taken together.
- 7.1.2 For promotion from I B. Tech. to II B. Tech. a student must satisfy the attendance requirements in I year (two semesters).
- 7.1.3 A Student shall be promoted from II year to III year, if he 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.
- 7.1.4 A student shall be promoted from III year to IV year if he / she fulfills the academic requirements of securing a minimum of **74** credits from I year I and II-Semesters, II year I and II-Semesters and the III year I and II-Semester examinations conducted till that time.
- 7.1.5 A student shall register for all the subjects and earn all the **195** credits. Marks obtained in all the credits shall be considered for the calculation of the class based on CCPA.
- 7.1.6 A student who fails to earn all the **195** credits as indicated in the course structure within **eight** academic years from the year of admission shall forfeit his seat in B. Tech. Programme and his admission stands cancelled.

7.2 For Lateral Entry Students (batches admitted from 2016 - 2017):

- 7.2.1 Academic requirements for pass in a subject are the same as in 7.1.1 and attendance requirements as in 6.3.
- 7.2.2 A student shall be promoted from II year to III year if he fulfills the academic requirements of securing a minimum of **22** credits from II year I and II-Semesters examinations conducted till that time.
- 7.2.3 A student shall be promoted from III year to IV year if he fulfills the academic requirements of securing a minimum of **46** credits from II year I and II-Semesters and the III year I and II-Semester examinations conducted till that time.
- 7.2.4 A student shall register for all the subjects and earn all **139** credits. Marks obtained in all such credits shall be considered for the calculation of the class based on CCPA.
- 7.2.5 A student who fails to earn all the **139** credits as indicated in the course structure within **six** academic years from the year of his admission shall forfeit his seat in B.Tech. Programme and his admission stands cancelled.

8. TRANSITORY REGULATIONS:

Students who got detained for want of attendance (or) who have 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 for the next batch or later batches with the same (or) equivalent subjects as and when subjects are offered and they continue to be in the academic regulations of the batch he is joining later.

9. CREDIT POINT AVERAGE (CPA) AND CUMULATIVE CREDIT POINT AVERAGE (CCPA):

9.1 For a Semester:

$$\text{Credit Point Average [CPA]} = \frac{1}{10} \frac{\sum_i C_i T_i}{\sum_i C_i}$$

Where C_i = Credits earned for Course i in any semester,

T_i = Total marks obtained for course i in any semester

9.2 For the entire programme:

$$\text{Cumulative Credit Point Average [CCPA]} = \frac{1}{10} \frac{\sum_n \sum_i C_{ni} T_{ni}}{\sum_n \sum_i C_{ni}}$$

Where n = the semester in which such courses were credited

9.3 Overall Performance:

| CCPA | Classification of final result |
|---------------------------|--------------------------------|
| 7.0 & above | First class with distinction |
| 6.0 & above but below 7.0 | First class |
| 5.0 & above but below 6.0 | Second class |
| 4.0 & above but below 5.0 | Pass |

10. 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.

11. ELIGIBILITY:

A student shall be eligible for the award of B.Tech. Degree if he fulfills all the following conditions:

- (i) Registered and successfully completed all the components prescribed in the programme of study to which he is admitted.
- (ii) Successfully acquired all **195 / 139 credits** as specified in the curriculum corresponding to the branch of study within the stipulated time.
- (iii) No disciplinary action is pending against him.

12. AWARD OF B.TECH DEGREE:

12.1 A student is permitted to select one of the extracurricular / extension activities like NSS / Sports / Games / Cultural activities. A certificate in one of these

activities is a must for the student to become eligible for the award of Provisional Certificate or Degree.

12.2 The B.Tech. Degree will be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu on the recommendations of the Principal of Annamacharya Institute of Technology and Sciences, Rajampet (Autonomous).

13. AMENDMENTS TO REGULATIONS:

The Chairman, Academic Council of Annamacharya Institute of Technology and Sciences, Rajampet (Autonomous) reserves the right to revise, amend, or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

14. Any legal issues are to be resolved in Rajampet Jurisdiction.

15. GENERAL:

Where the words "he", "him", "his", "himself" occur in the regulations, there include "she", "her", "herself".

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES
DEPARTMENT OF CIVIL ENGINEERING**

Regulations :R15

Programme Code: G6

I Year B. Tech., I Semester

| Subject Code | Subject Name | Hours / Week | | | C |
|--------------|--|--------------|----------|-----------|-----------|
| | | L | T | P | |
| 5GC11 | English through Literature | 2 | 1 | 0 | 2 |
| 5GC12 | Engineering Chemistry | 4 | 1 | 0 | 4 |
| 5GC14 | Engineering Mathematics-I | 3 | 1 | 0 | 3 |
| 5G111 | Problem solving techniques and Introduction to C Programming | 3 | 1 | 0 | 3 |
| 5G511 | Engineering Mechanics - Statics | 3 | 1 | 0 | 3 |
| 5G512 | Engineering Graphics -I | 2 | -- | 6 | 5 |
| 5GC16 | ELCS Lab-I | -- | -- | 3 | 2 |
| 5GC17 | Engineering Chemistry Lab | -- | -- | 3 | 2 |
| 5G113 | Problem Solving Through C Lab | -- | -- | 3 | 2 |
| 5G514 | Engineering Workshop | -- | -- | 3 | 2 |
| Total | | 17 | 5 | 18 | 28 |

I Year B. Tech., II Semester

| Subject Code | Subject Name | Hours / Week | | | C |
|--------------|--|--------------|----------|-----------|-----------|
| | | L | T | P | |
| 5GC21 | Technical English | 2 | 1 | 0 | 2 |
| 5GC23 | Engineering Physics | 4 | 1 | 0 | 4 |
| 5GC24 | Engineering Mathematics-II | 3 | 1 | 0 | 3 |
| 5G121 | C programming and Data Structures | 3 | 1 | 0 | 3 |
| 5G521 | Engineering Mechanics -Dynamics | 3 | 1 | 0 | 3 |
| 5G522 | Engineering Graphics -II | 2 | -- | 6 | 5 |
| 5GC26 | ELCS Lab-II | -- | -- | 3 | 2 |
| 5GC28 | Engineering Physics Lab | -- | -- | 3 | 2 |
| 5G123 | Programming in C and Data Structures Lab | -- | -- | 3 | 2 |
| 5G124 | IT Workshop | -- | -- | 3 | 2 |
| Total | | 17 | 5 | 18 | 28 |

Note: L - Lecture; T-Tutorial; P – Practical; C – Credits

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES
DEPARTMENT OF CIVIL ENGINEERING**

Regulations :R15

Programme Code: G6

II Year B. Tech., I Semester

| Subject Code | Subject Name | Hours / Week | | | C |
|--------------|---------------------------------------|--------------|-----------|----------|-----------|
| | | L | T | P | |
| 5GC31 | Engineering Mathematics-III | 3 | 1 | 0 | 3 |
| 5G538 | Electrical and Mechanical Technology* | 3 | 1 | 0 | 3 |
| 5G631 | Strength of Materials-I | 3 | 1 | 0 | 3 |
| 5G632 | Surveying | 3 | 1 | 0 | 3 |
| 5G633 | Fluid Mechanics | 3 | 1 | 0 | 3 |
| 5G634 | Building Materials and Construction | 3 | 1 | 0 | 3 |
| 5GC35 | Aptitude & Reasoning skills | 2 | -- | -- | 2 |
| 5G635 | Surveying Lab-I | 0 | 0 | 3 | 2 |
| 5G636 | Strength of Materials Lab | 0 | 0 | 3 | 2 |
| Total | | 20 | 12 | 6 | 24 |

NOTE: *In Electrical and Mechanical Technology two questions from each part should be chosen to answer five questions in the End semester examination.

II Year B. Tech., II Semester

| Subject Code | Subject Name | Hours / Week | | | C |
|--------------|--|--------------|----------|----------|-----------|
| | | L | T | P | |
| 5GC42 | Probability and Statistics | 3 | 1 | 0 | 3 |
| 5GC43 | Environmental Science | 3 | 1 | 0 | 3 |
| 5G641 | Strength of Materials-II | 3 | 1 | 0 | 3 |
| 5G642 | Hydraulics and Hydraulic Machinery | 3 | 1 | 0 | 3 |
| 5G643 | Structural Analysis-I | 3 | 1 | 0 | 3 |
| 5G644 | Building Planning and Drawing | 3 | 1 | 0 | 3 |
| 5G645 | Fluid Mechanics and Hydraulics Hydraulic Machinery Lab | 0 | 0 | 3 | 2 |
| 5G646 | Surveying Lab II | 0 | 0 | 3 | 2 |
| 5G647 | Seminar – I | 0 | 2 | 0 | 2 |
| Total | | 18 | 8 | 6 | 24 |

Note: L - Lecture; T-Tutorial; P – Practical; C – Credits

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES
DEPARTMENT OF CIVIL ENGINEERING**

Regulations :R15

Programme Code: G6

III Year B. Tech., I Semester

| Subject Code | Subject Name | Hours / Week | | | C |
|--------------|--|--------------|----------|----------|-----------|
| | | L | T | P | |
| 5GA51 | Managerial Economics and Financial Analysis | 3 | 1 | 0 | 3 |
| 5G651 | Structural Analysis-II | 3 | 1 | 0 | 3 |
| 5G652 | Engineering Geology | 3 | 1 | 0 | 3 |
| 5G653 | Water Resource Engineering -I | 3 | 1 | 0 | 3 |
| 5G654 | Environmental Engineering-I | 3 | 1 | 0 | 3 |
| 5G655 | Design and Drawing of Reinforced Concrete Structures | 3 | 1 | 0 | 3 |
| 5GC52 | English for Competitive Examination | 2 | 1 | 0 | 2 |
| 5G656 | Environmental Engineering Lab | 0 | 0 | 3 | 2 |
| 5G656 | Engineering Geology Lab | 0 | 0 | 3 | 2 |
| Audit course | *Advanced English communication skills lab | 0 | 0 | 3 | 0 |
| Total | | 20 | 7 | 9 | 24 |

III Year B. Tech., II Semester

| Subject Code | Subject Name | Hours / Week | | | C |
|---------------------------------|---|--------------|----------|----------|-----------|
| | | L | T | P | |
| 5G661 | Water Resource Engineering-II | 3 | 1 | 0 | 3 |
| 5G662 | Advanced RCC Design | 3 | 1 | 0 | 3 |
| 5G663 | Geotechnical Engineering | 3 | 1 | 0 | 3 |
| 5G664 | Transportation Engineering | 3 | 1 | 0 | 3 |
| PROFESSIONAL ELECTIVE I | | 3 | 1 | 0 | 3 |
| 5G665 | Environmental Engineering-II | | | | |
| 5G666 | Ground Improvement Techniques | | | | |
| 5G667 | Green Buildings | | | | |
| 5G668 | Advanced Structural Analysis | | | | |
| PROFESSIONAL ELECTIVE II | | 3 | 1 | 0 | 3 |
| 5G669 | Construction Planning and Project Management | | | | |
| 5G66A | Finite Element Method for civil Engineering | | | | |
| 5G66B | Earth Quake Resistant Design | | | | |
| 5G66C | Environmental Impact Assessment for Infrastructure Projects | | | | |
| 5G66D | Transportation Engineering Lab | 0 | 0 | 3 | 2 |
| 5G66E | Geotechnical Engineering Lab | 0 | 0 | 3 | 2 |
| 5G66G | Seminar-II/Surveying camp | 0 | 0 | 2 | 2 |
| Audit course | Professional Ethics / Stress Management | -- | -- | 2 | 0 |
| Total | | 18 | 6 | 8 | 24 |

Note: L - Lecture; T-Tutorial; P – Practical; C – Credits

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES
DEPARTMENT OF CIVIL ENGINEERING**

Regulations :R15

Programme Code: G6

IV Year B. Tech., I Semester

| Subject Code | Subject Name | Hours / Week | | | C |
|----------------------------------|---|--------------|----------|----------|-----------|
| | | L | T | P | |
| 5G671 | Foundation Engineering | 3 | 1 | 0 | 3 |
| 5G672 | Design and Drawing of steel structures | 3 | 1 | 0 | 3 |
| 5G673 | Bridge Engineering | 3 | 1 | 0 | 3 |
| 5G674 | Concrete Technology | 3 | 1 | 0 | 3 |
| PROFESSIONAL ELECTIVE III | | 3 | 1 | 0 | 3 |
| 5G675 | Prestressed concrete | | | | |
| 5G676 | Railway Docks and Harbour Engineering | | | | |
| 5G677 | Advanced Environmental Engineering | | | | |
| 5G678 | Ground water development and management | | | | |
| | OPEN ELECTIVE | 3 | 1 | 0 | 3 |
| 5G67D | CAD and STAAD Lab | 0 | 0 | 3 | 2 |
| 5G67E | Concrete Technology Lab | 0 | 0 | 3 | 2 |
| 5G67F | Comprehensive Civil Engineering | 0 | 2 | 0 | 2 |
| Total | | 18 | 8 | 6 | 24 |

| LIST OF OPEN ELECTIVES SUBJECTS | | Offered By Department of |
|--|----------------------------------|-------------------------------------|
| 5G679 | Disaster Management | CE |
| 5G27C | System Modelling and Simulation | EEE |
| 5G57D | Total Quality Management | ME |
| 5G57E | Integrated Product Development | ME |
| 5G377 | Nano Technology and Applications | ECE |
| 5G378 | Medical Instrumentation | ECE |
| 5G178 | .NET Technologies | CSE |
| 5G473 | Cyber Laws | IT |
| 5GA71 | Intellectual Property Rights | DBA |
| 5GA72 | Human Resource Management | DBA |

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET
 (AN AUTONOMOUS INSTITUTION)
DEPARTMENT OF CIVIL ENGINEERING

Regulations: **R15**Programme Code: **G6****IV Year B. Tech. II Semester**

| Subject Code | Subject Name | Hours / Week | | | C |
|--------------|---|--------------|-----------|----------|-----------|
| | | L | T | P | |
| 5G681 | Design and Drawing of Irrigation Structures | 3 | 1 | 0 | 3 |
| 5G682 | Estimation, Costing and Valuation | 3 | 1 | 0 | 3 |
| 5G68A | MOOC | 3 | 0 | 0 | 3 |
| 5G68B | Seminar-III | 0 | 2 | 0 | 2 |
| 5G68C | Project Work | 0 | 12 | 0 | 8 |
| Total | | 9 | 16 | 0 | 19 |

Note: L - Lecture; T-Tutorial; P – Practical; C – Credits

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. I Semester

**(5GC11) ENGLISH THROUGH LITERATURE
(Common to all branches)**

Course Objectives:

- To improve the language proficiency of the students in English through literature
- To enhance the vocabulary of the students in English through the use of diverse authentic materials
- To enable the students absorb the human values expressed in literature

Unit I

DETAILED STUDY: *Cabuliwallah* by Rabindranath Tagore; *The Road not Taken* by Robert Frost

NON-DETAILED STUDY: G. D. Naidu

Unit II

DETAILED STUDY: *A Dog's Tale* by Mark Twain; *If* by Rudyard Kipling

NON-DETAILED STUDY: Sudha Murthy

Unit III

DETAILED STUDY: *The Gift of Magi* by O. Henry; *Leisure* by W. H. Davies

NON-DETAILED STUDY: Vijay Bhatkar

Unit IV

DETAILED STUDY: *An Astrologer's Day* by R. K. Narayan; *Night of the Scorpion* by Nissim Ezekiel;

NON-DETAILED STUDY: Jagadish Chandra Bose

Unit V

DETAILED STUDY: *The Proposal* by Anton Chekhov

NON-DETAILED STUDY: Homi Jehangir Baba

Text Books:

1. For Detailed study: Texts from Open Sources (Available on Web)
2. For Non-detailed study: *Trailblazers* published by Orient Black Swan
 - Texts from open sources are included in the syllabus to make the teaching-learning process more interesting and inspiring. Also, the literary texts from open sources will allow the student learn language through literature. The book for the non-detailed study allows the student to have an insight into the lives and careers of some legendary personalities.
 - The text for non-detailed study is meant for extensive reading by the students. They may be encouraged to read some select topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements etc.

Course Outcomes:

- The student will appreciate the significance of silent reading and comprehension
- The student develops critical thinking and creative writing skills through exposure to literary texts
- The student will understand the components of different forms of writing

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. I Semester

**(5GC12) ENGINEERING CHEMISTRY
(Common to CSE, IT, ME and CE)**

Course Objectives:

- The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
- The Engineering Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
- The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
- The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.
- After completion of the course, the student would understand about the concepts of chemistry in respect of Electrochemical cells, fuel cells, mechanism of corrosion and factors to influence, polymers with their applications, analytical methods, engineering materials and water chemistry.

Unit I

WATER TREATMENT: Impurities in water, Hardness of water and its Units, Disadvantages of hard water, Estimation of hardness by EDTA method, Numerical problems on hardness, Estimation of dissolved oxygen, Alkalinity and chlorides in water, Water treatment for domestic purpose Disinfection- Definition, Kinds of disinfectants (Bleaching powder, Ozone, chloramine, UV light and Chlorine), Break point chlorination.

INDUSTRIAL USE OF WATER: For steam generation, Boiler troubles: Scale & Sludge, Priming and Foaming, Caustic Embrittlement and Boiler Corrosion.

Treatment of Boiler Feed water: Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate conditioning. External Treatment: Permutit/ Zeolite process, Ion-Exchange process, Desalination of brackish water by Reverse Osmosis.

Unit II

ELECTROCHEMISTRY: Electrochemical cells-Basic concepts, classification of electrochemical cells, numerical calculations, Batteries: classification of batteries: Primary (Leclanche battery, mercury battery) and Secondary /rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries) Fuels cells: (Hydrogen-Oxygen and Methanol-Oxygen)

ELECTROCHEMICAL SENSORS: Potentiometric Sensors and Voltammetric sensors. Examples: analysis of Glucose and urea.

CORROSION: Definition & Types (dry & wet Corrosions), Electrochemical Theory of corrosion, concentration cell corrosion, galvanic corrosion, factors affecting the corrosion, Prevention: Anodic and Cathodic protection, Electroplating (Nickel, copper and chromium) & Electrolessplating

Unit III

POLYMERS: Introduction to polymers, Polymerization process- types (without mechanism), Plastics: Thermosetting and Thermoplastics, Preparation, properties and Engineering applications of PVC, Bakelite, nylons.

NATURAL RUBBER: Processing, vulcanization and compounding of rubber. Elastomers: Preparation, properties and engineering applications of Buna-S, Buna-N and polyurethane rubbers.

CONDUCTING POLYMERS: Mechanism, synthesis and applications of polyacetylene, polyaniline. Biodegradable polymers Carbohydrates, proteins

INORGANIC POLYMERS: Basic Introduction Silicones, polyphosphazines.

Unit IV

FUEL TECHNOLOGY: Classification of Fuels – Characteristics of Fuels- Calorific Value – Units, its determination using bomb calorimeter, Numerical Problems. Solid Fuels-Coke: Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.

LIQUID FUELS: Petroleum: Refining of Petroleum, Gasoline: Knocking, Octane Number, Synthetic Petrol: Bergius Processes, Fischer Tropsch's synthesis. Diesel and Cetane number. Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

GASEOUS FUELS: Origin, Production and uses of Natural gas, Producer gas, Water gas, Coal gas and Biogas. Flue Gas analysis by Orsat's apparatus, Solving of problems on Combustion.

Unit V

CHEMISTRY OF ENGINEERING MATERIALS

CEMENT: Composition & manufacture of Portland cement, Setting and Hardening (Hydration and Hydrolysis), Refractories: Classification with suitable examples, properties and applications

LUBRICANTS: Definition and properties of lubricants, theory of lubrication, and applications of lubricants.

ROCKET PROPELLANTS: Classification, Characteristics of a good propellant

Text Books:

1. Engineering Chemistry by K.N.Jayaveera, G.V.Subba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, New Delhi, Fourth Edition, 2012.
2. A Text Book of Engineering Chemistry, Jain and Jain, DhanapathRai Publishing Company, New Delhi, 15th Edition, 2010.

Reference Books:

1. A Text book of Engineering Chemistry by S.S Dhara, S.S.Umare, S. Chand Publications, New Delhi, 12th Edition, 2010.
2. Engineering Chemistry by K.B.ChandraSekhar, UN.Das and Sujatha Mishra, SCITECH, Publications India Pvt Limited, Chennai, 2nd Edition, 2012.
3. Concepts of Engineering Chemistry- Ashima Srivastava and N.N. Janhavi, Acme Learning Pvt Ltd, First Edition, 2013.
4. Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and Andra Naidu, BS Publications, Hyderabad, 3rd Edition, 2008.
5. Text Book of Engineering Chemistry, Shashichawla, Dhanapath Rai Publications, New Delhi, 4th Edition, 2011.
6. Engineering Chemistry, K. SesaMaheswaramma and Mrudula Chugh, Pearson Education, First Edition, 2013.

Course Outcomes:

The student is expected to

- Understand the functions of fuel cells, batteries and extends the knowledge to the processes of corrosion and its prevention.
- Understand industrially based polymers, various engineering materials.
- Differentiate between hard and soft water.
- Understand the disadvantages of using hard water domestically and industrially.
- Select and apply suitable water treatment methods domestically and industrially.
- Understand the manufacture of synthetic petrol.
- Differentiate between thermoplastics and thermosetting plastics.
- Understand the manufacture, setting and hardening of cement.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. I Semester

**(5GC14) ENGINEERING MATHEMATICS – I
(Common to all branches)**

Course Objectives:

The course aims to provide the student with the ability

- To understand the Differential equations of first, second and higher orders with their applications.
- To understand the concept of partial differentiation and its applications.
- To understand the concept of curve tracing in various forms

Unit I

Linear and Bernoulli equations. Applications to Newton's law of cooling, law of natural growth and decay, Chemical reaction and solutions, orthogonal trajectories.

Unit II

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax} , $\sin ax/\cos ax$, polynomials in x , $e^{ax} V(x)$, $xV(x)$, method of variation of parameters. Applications to oscillatory electrical circuits.

Unit III

Rolle's Theorem – Lagrange's Mean Value Theorem (without proof). Simple examples of Taylor's and Maclaurin's Series.

Infinite series – Comparison test, Integral test, Ratio test, Cauchy's root test– Alternating series: Leibnitz rule (Without proof).

Unit IV

Functions of several variables – Partial differentiation- Chain rule-Jacobian – Maxima and Minima of functions of two variables, Lagrangian method of Multipliers with three variables only.

Unit V

Curve tracing – Tracing of Cartesian, polar and parametric curves.

Text Book:

Higher Engineering Mathematics, B.S.Grewal, Khanna publishers-43rd Edition (2014)

References Books:

1. Higher Engineering Mathematics, by Kreyszing
2. A Text Book of Engineering Mathematics, B.V. Ramana, Tata McGraw Hill.
3. A Text Book of Engineering Mathematics, Vol – 1, T.K.V. Iyengar, B. Krishna Gandhi and others, S.Chand& Company.* Tutorial

Course Outcomes:

Upon completion of the course, students should be able to

- Understand the various types of ordinary differential equations
- Have the knowledge on functions of several variables.
- Understand the concepts of curve tracing

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. I Semester

**(5G111) PROBLEM SOLVING TECHNIQUES AND INTRODUCTION TO C
PROGRAMMING**

(Common to ALL branches)

Course Objectives:

- Introduction to computer peripherals, Software development.
- Describe when and how to use the stand C statement and to Write, Compile and Debug basic C programs using an IDE
- Write and debug programs using an IDE and the principles of designing
- Structured programs when and how to use the appropriate statements available in the C language
- Write basic C programs using , Selection statements, Repetitive statements, Functions, Pointers, Arrays and Strings
- Implementation of C applications for data structures, Sorting and Searching.

Unit I

INTRODUCTION TO COMPUTER PROBLEM SOLVING: Introduction to Computer Systems, Computer Environments, Computer Languages, Introduction to Problem Solving Aspect, Top- down Design, Implementation of Algorithms, Flow Charts, SDLC.

Unit II

INTRODUCTION TO C LANGUAGE: Structure of a C Language program, Creating and Running C programs, Keywords, Identifiers, Data Types, Type def, enumerated Types variables, constants, input/output. Operators and Expressions, precedence and associatively, Type Conversions, Bitwise Operators. Example programs for each topic.

Unit III

C Program Statements, Selection and Decision making Statements-two way selection –if...else statements, multi way selection-switch statements. Loop Control Statements-concept of a loop, Loops in C-while loop, do...while loop, for loop, Other Related Statements -break, continue, goto. Example programs for each topic.

Unit IV

ARRAYS: Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Multidimensional Arrays.

STRINGS: String Basics, String Library Functions, Array of Strings. Example programs for each topic.

Unit V

FUNCTIONS: Library Functions in C, User defined Functions,-declaration, definition, calling of function , types of User defined functions, Parameter passing methods-pass by value, pass by reference, Scope, Storage Classes - Auto, Register, Static, Extern, Scope rules, Type Qualifiers, Recursion - Recursive Functions,

Preprocessor Commands. Using Array Elements as Function Arguments. Example programs for each topic.

Text Books:

1. C Programming and Data Structures. B.A. Forouzan, R. F. Gilberg, Cengage learning, Indian edition.
2. Programming in C and Data Structures, J.R. Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
3. C and Data Structures, E. Balaguruswamy, Tata McGraw Hill.
4. How to Solve it By Computer, R.G. Dromey, PHI.

Reference Books:

1. C and Data Structures, A snapshot oriented treatise with live engineering examples, Dr. N.B. Venkateswarlu, Dr. E.V. Prasad, S. Chand.
2. LET US C, Yeswanth Kanitkar, Ninth Edition, BPB Publication.

Course Outcomes:

After completion of the course student will be able to

- Understand the importance of the software development process and System development tools.
- Understand general principles of C programming language and able to write simple program in C. Able to develop programs based on arrays and functions.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. I Semester

**(5G511) ENGINEERING MECHANICS-STATICS
(Common to ME and CE)**

Course Objective:

- This course will serve as a basic course by introducing the concepts of basic mechanics which will help as a foundation to various courses.
- Develop an understanding of the principles of statics and the ability to analyze problems in a systematic and logical manner, including the ability to draw free-body diagrams. Ability to analyze the statics of trusses, frames and machines.

Unit I

INTRODUCTION TO ENGINEERING MECHANICS: Basic concepts - System of forces—Resultant of a force system, Moment of forces and its Application & Couples, Spatial Forces-Components in space, Resultant Equilibrium of system forces, free body diagrams.

Unit II

TYPES OF SUPPORTS: Support reactions for beams with different types of loading – concentrated, uniformly distributed load, uniformly varying loading and couple.

ANALYSIS OF FRAMES (ANALYTICAL METHOD): Types of Frames – Assumptions for forces in members of a perfect frame. Method of Joints, Method of Sections, Cantilever trusses and Simply supported trusses.

Unit III

FRICTION:Types of friction– Static and Dynamic Frictions, laws of Friction– Limiting friction and impending motions–Cone of limiting friction– Motion of bodies – Wedge friction – Ladder friction.

Unit IV

CENTROID AND CENTER OF GRAVITY: Centroids of simple figures – Centroids of Composite figures – Centre of Gravity of bodies –Theorem of Pappu's and Guldinus Centre of Gravity of Composite figures. (Simple problems only).

Unit V

MOMENT OF INERTIA: Area moment of Inertia - Parallel axis and perpendicular axis theorems - Moments of Inertia of Composite Figures,

MASS MOMENT OF INERTIA: Moment of Inertia of Simple solids, Moment of Inertia of composite masses. (Simple problems only)

Text Books:

1. Engineering Mechanics-Statics and Dynamics, A.Nelson, Tata McGraw-Hill Company.
2. Engineering Mechanics, R.K Bansal - Laxmi Publications
3. Singer's Engineering Mechanics, B. Vijay kumarreddy – B.S. Publishers.
4. Engineering Mechanics, Bhavikatti and Rajasekharappa

Reference Books:

1. Engineering Mechanics by Timoshenko & young, Tata McGraw-Hill Company
2. Engineering Mechanics – B. Bhattacharya- Oxford University Publications
3. Engineering Mechanics –Arthur P. Boresi and Richard J. Schmidt. – Brooks/Cole – Cengage Learning
4. Engineering Mechanics-Statics & Dynamics—Johnson & Beer

Course Outcomes:

The students are able to

- Use the concepts of force, moment and its application.
- Construct free-body diagrams and to calculate the reactions necessary to ensure static equilibrium.
- Get knowledge of internal forces and moments in members.
- Learn concept of friction and applications.
- Find centroid and centre of gravity of simple and composite bodies.
- Find moment of inertia and polar moment of inertia including transfer methods and their applications.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. I Semester

**(5G512) ENGINEERING GRAPHICS – I
(Common to ME and CE)**

Course Objectives:

- To enable the students with various concepts like Dimensioning, Conventions and standards related to working drawing in order to become professionally efficient.
- To introduce fundamental concepts of curves used in engineering, projection of points, lines and planes.
- To impart and inculcate proper understanding of the theory of projections.
- Able to understand and visualize geometrical curves, projections of lines and planes.

Unit I

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

Unit II

CYCLOIDAL CURVES: Cycloid, Epicycloid and Hypocycloid (treatment of simple problems) –Involute – Square, Pentagon, Hexagon and Circle.

Unit III

PROJECTIONS OF POINTS AND LINES: Projections of Points and Projections of Lines-Inclined to one reference plane - Inclined to both reference planes, Finding the True lengths - Traces.

Unit IV

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

Unit V

AUXILIARY PLANES: Projection of lines and planes using auxiliary planes.

Text Books:

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

Reference Books:

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

Course Outcomes:

- Students will be able to know and understand the conventions and the methods of Engineering Graphics.
- Able to understand the application of industry standards and techniques applied in engineering graphics.
- Dimension and annotate two-dimensional engineering drawings.
- Students will be able to improve their visualization skills so that they can apply these skills in developing the new products.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. I Semester

**(5GC16) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB – I
(Common to all branches)**

Course Objectives:

- To train students to use language effectively in everyday conversations
- To expose the students to a varied blend of self-instructional, learner-friendly modes of language learning
- To enable the students learn better pronunciation through emphasis on individual speech sounds

The following course content is prescribed for the **English Language Laboratory** sessions:

- 1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants**
- 2. Situational Dialogues and Role-play**
- 3. Telephone Skills**
- 4. Describing Objects / Situation / People**

Manual cum Record, prepared by the Faculty Members of English of the college will be used by Students.

Minimum Requirement:

The English Language Lab shall have two parts:

- **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
- **The 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.

Suggested Software:

Sky Pronunciation Suite

Connected Speech from Clarity

Clarity Pronunciation Power – Part I

Mastering English in Vocabulary, Grammar, Spellings, Composition

English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

Dorling Kindersley - Series of Grammar, Punctuation, Composition etc.

Language in Use, Foundation Books Pvt Ltd with CD

Learning to Speak English - 4 CDs

Microsoft Encarta with CD

Cambridge Advanced Learners' English Dictionary with CD.

Murphy's English Grammar, Cambridge with CD.

Course Outcomes:

- The student will be able to express himself fluently in social and professional contexts
- The student will learn how to neutralize his accent

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. I Semester

**(5GC17) ENGINEERING CHEMISTRY LAB
(Common to CSE, IT, ME and CE)**

Course Objectives:

- The student will learn practical understanding of the redox reaction.
- The student will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineer these to suit diverse applications.
- The student will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology.

LIST OF EXPERIMENTS

Any 10 of the following experiments has to be performed

VOLUMETRIC ANALYSIS

Redox Titrations

1. Estimation of iron (II) using Diphenylamine indicator (Dichrometry – Internal indicator method)
2. Estimation of Chloride ion using potassium Chromite indicator (Mohr's method)

Water analysis

3. Determination of total hardness of water by EDTA method
4. Estimation of Dissolved Oxygen by Winkler's method
5. Determination of acidity of Water
6. Determination of Alkalinity of Water.

Complexometry

7. Determination of Copper by EDTA method

Iodometry

8. Determination of Copper by Iodometry

INSTRUMENTATION

Colorimetry

9. Estimation of Iron in Cement by Colorimetry.

Conductometry

10. Conductometric titration of strong acid Vs strong base (Neutralization titration)

Fuel analysis

11. Determination of Calorific Value of fuel by using Bomb Calorimeter

Lubricants

12. Determination of Viscosity of oils using Redwood Viscometer I
13. Determination of Viscosity of oils using Redwood Viscometer II

PREPARATION OF POLYMERS

14. Preparation of Bakelite

15. Preparation of Thiokol rubber

Manual cum Record: Prepared by the Faculty Members of Engineering Chemistry of the college will be used by Students.

Equipment Required:

- ✓ Analytical weighing balance
- ✓ Digital Conductometer
- ✓ Photo-colorimeter
- ✓ Bomb calorimeter
- ✓ Redwood viscometers
- ✓ Deionizer plant
- ✓ Digital electronic balance

Glassware Required:

Pipettes, burettes, conical flasks, standard flasks, beakers, reagent bottles, spatulas, wash bottles, BOD Bottles, measuring cylinders, glass rods, Bunsen burners, funnels, thermometers etc.

Chemicals Required:

EDTA, Hypo, Mohr Salt Solution, HCl, Sulphuric Acid, Copper Solution, Iron Solution, Potassium Dichromate Solution, Potassium Iodide Solution, Buffer Solution, diphenyl amine, EBT indicator, NaOH solution, Benzoic acid Urea, distilled water etc.

Reference Books:

1. Vogel's Text book of Quantitative Chemical Analysis, J. Mendham et al, Pearson Education, Sixth Edition, 2012.
2. Chemistry Practical – Lab Manual by K.B.ChandraSekhar, G.V. Subba Reddy and K.N.Jayaveera, SM Publications, Hyderabad, 3rd Edition, 2012.

Course Outcomes:

- The student would be confident in understanding of redox systems
- The student would have acquired the practical skill to handle the analytical methods with confidence.
- The student would feel comfortable to think of design materials with the requisite properties
- The student would be in a position to technically address the water related problems.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. I Semester

**(5G113)PROBLEM SOLVING THROUGH C LAB
(Common to ECE, EEE, ME and CE)**

Course Objectives:

- To make the student learn a programming language.
- To teach the student to write programs in C to solve the problems.
- To introduce the student to simple linear data structures such as lists, stacks, queues.

Recommended Systems/Software Requirements:

- Intel based desktop PC with ANSI C/ TURBO C Compiler and Supporting Editors

Exercise 1:

Minimum of 4 programs on Data types, Variables, Constants and Input and Output.

Exercise 2:

Minimum of 4 programs on Operator, Expressions and Type Conversions.

Exercise 3:

Minimum of 4 programs on Conditional Statements [two way and multipath].

Exercise4:

Minimum of 4 programs on Loop Control Statements [for, while and do-While]

Exercise 5:

Minimum of 4 programs on Unconditioned JUMP Statements- break, continue, Goto.

Exercise 6:

Minimum of 4 programs on Declaring Arrays, Referencing Arrays, Array Subscripts. Using for loop for sequential Access.

Exercise 7:

Minimum of 4 programs on Multidimensional Arrays.

Exercise 8:

Minimum of 4 programs on String Basics, String Library Functions and Array of Strings.

Exercise 9:

Minimum of 4 programs on simple user defined functions, Parameter passing methods- pass by value, pass by reference.

Exercise 10:

Minimum of 4 programs on Storage classes- Auto, Register, Static and Extern

Exercise11:

Minimum of 4 programs on Recursive Functions, Preprocessor commands.

Exercise 12:

Minimum of 4 programs on using Array Elements as Function Arguments.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. I Semester

**(5G514) ENGINEERING WORKSHOP
(Common to ME and CE)**

Course Objective:

The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially, know the labour involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.

1. TRADES FOR EXERCISES:

- A. **CARPENTRY SHOP**– Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, cross lap joint, mortise and tenon T joint, Bridle T joint from out of 300 x 50 x 50 mm soft wood stock
- B. **FITTING SHOP**– Two joints (exercises) from: square joint, V joint, half round joint or dove tail joint out of 100 x 50 x 5 mm M.S. stock.
- C. **SHEET METAL SHOP**– Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22 or 20 gauge G.I. sheet.
- D. **HOUSE-WIRING**– Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.
- E. **FOUNDRY**–Preparation of two moulds (exercises): for a single pattern and a double pattern.
- F. **WELDING** – Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint

2. TRADES FOR DEMONSTRATION:

- A. **PLUMBING**
- B. **MACHINE SHOP**
- C. **METAL CUTTING**

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

Reference Books:

1. Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009.
2. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapoovan, Saravana Pandian, 4/e Vikas.
4. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. II Semester

(5GC21) TECHNICAL ENGLISH

(Common to all branches)

Course Objectives:

- To improve the language proficiency of the students in English with an emphasis on LSRW skills
- To equip the students with comprehension skills to study academic subjects with greater facility.
- To develop English communication skills of the students in formal and informal situations

Unit I

Sure Outcomes: Technology with a Human Face

Grammar: Kinds of Verbs and their Use; Writing: Official Letters; Vocabulary: Synonyms and Antonyms, Prefixes and Suffixes, Idioms and Phrases

Unit II

Sure Outcomes: Climatic Change and Human Strategy

Grammar: Tenses; Writing: Letters of Application; Vocabulary: One-word Substitutes

Unit III

Sure Outcomes: Emerging Technologies: Solar Energy in Spain

Grammar: Types of Sentences: Simple, Compound and Complex; Declarative, Interrogative, Imperative and Exclamatory; Writing: E-mails; Vocabulary: Commonly Confused Words

Unit IV

Sure Outcomes: Water: The Elixir of Life

Grammar: Subject-Verb Agreement; Writing: Official Reports, Technical Reports; Vocabulary: English Spelling, Commonly misspelt words

Unit V

Sure Outcomes: The Secret of Work

Grammar: Active and Passive Voice; Writing: Note-making; Vocabulary: Connotations

TextBook:

Sure Outcomes published by Orient Black Swan (with CD)

- The book prescribed serves as students' handbook. The reader comprises essays which are particularly relevant to engineering students.
- The teacher should focus on developing LSRW skills of students while using the prescribed text and exercises. The classes should be interactive. The students should be encouraged to participate in the classroom proceedings and also to write short paragraphs and essays. The main aim is to encourage two-way communication in place of one-sided lecture.

Reference Books:

1. Essential Grammar in Use, (with CD), Raymond Murphy, 3/e, Cambridge University Press, 2009
2. Basic Communication Skills for Technology, Andrea J Ruthurford, Pearson Education, Asia.
3. English for Technical Communication, AyshaViswamohan, Tata Mc-Graw Hill
4. English Grammar and Composition, David Grene, Mc Millan India Ltd.
5. Murphy's English Grammar, Raymond Murphy, CAMBRIDGE
6. Everyday Dialogues in English by Robert J. Dixson, Prentice-Hall of India Ltd., 2006.
7. Communication Skills for Technical Students, Farhathullah, T.M., Orient Blackswan, 2008
8. Developing Communication Skills, 2/e. by Krishna Mohan &MeeraBanerji , Macmillan, 2009
9. English for Technical Communication, Vol. 1 & 2, by K. R. Lakshmi Narayanan, Sci tech. Publications.
10. Longman Dictionary of Contemporary English with DVD, Pearson Longman

Course Outcomes:

- The student will demonstrate the ability to guess the contextual meaning of the words and grasp the overall message of the text to draw inferences
- The student will understand the components of different forms of writing
- The student will exhibit effective writing skills through his understanding of English Grammar

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. II Semester

**(5GC23) ENGINEERING PHYSICS
(Common to CSE, IT, ME and CE)**

Course Objectives:

- The mission of the Engineering Physics course is to prepare students for careers in engineering where physics principles can be applied to the advancement of technology.
- The Engineering Physics course educates the principles of optical science and engineering necessary to understand optical systems.
- The Crystallography, X-ray diffraction of crystals and crystal defects explains how basic structure modulates properties of materials.
- The principles of quantum mechanics and electron theory of metals gives an idea on basic development of energy in metals.
- The main objective of this course is to provide basic understanding of different engineering materials (semiconductors, magnetic, superconducting and nano materials).

Unit I

PHYSICAL OPTICS, LASERS AND FIBRE OPTICS:

Physical Optics: Introduction - Interference in thin films by reflection – Newton's Rings – Fraunhofer diffraction due to single slit, double slit and diffraction grating.

Lasers: Introduction - Characteristics of laser – Spontaneous and stimulated emission of radiation - Einstein's coefficients - Population inversion – Ruby laser - He-Ne laser - Semiconductor laser - Applications of lasers. Holography: Construction and Re-Construction of hologram - Applications

Fiber optics: Introduction– Construction and working principle of optical fiber – Numerical Aperture and acceptance angle – Types of optical fibers – Optical fiber communication system – Applications of optical fibers in communications, sensors and medicine.

Unit II

CRYSTALLOGRAPHY AND ULTRASONICS:

Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters – Bravais lattice –Crystal systems – Packing fractions of SC, BCC and FCC - Directions and planes in crystals – Miller indices – Inter planar spacing in cubic crystals – X-ray diffraction - Bragg's law – Powder method– Defects in solids: point defects and types.

*Ultrasonics:*Introduction – Properties – Production of ultrasonics by piezoelectric method and detection – Applications in non-destructive testing.

Unit III**QUANTUM MECHANICS AND FREE ELECTRON THEORY:**

Quantum Mechanics: Introduction to matter waves – de-Broglie's hypothesis - Heisenberg's uncertainty principle - Schrodinger's time independent wave equation – Significance of wave function - Particle in a one dimensional infinite potential well.

Free electron theory: Classical free electron theory – Sources of electrical resistance – Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution – Kronig - Penny model (qualitative) – Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators.

Unit IV**SEMICONDUCTORS AND MAGNETIC MATERIALS:**

Semiconductors: Introduction – Intrinsic and extrinsic semiconductors – Drift & diffusion currents and Einstein's equation – Hall Effect - Direct and indirect band gap semiconductors – Working principle of p-n junction diode, LED and photodiode.

Magnetic materials: Introduction and basic definitions – Origin of magnetic moments – Bohr magneton – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials – Hysteresis - Soft and hard magnetic materials and applications.

Unit V**SUPERCONDUCTIVITY AND NANOMATERIALS:**

Superconductivity: Introduction – Properties of superconductors - Meissner effect – Type I and type II superconductors – Flux quantization – London penetration depth – BCS theory (qualitative) – ac and dc Josephson effects- Applications of superconductors.

Nanomaterials: Introduction - Significance of nanoscale – Basic principles of nano materials (Surface area and quantum confinement) – Physical properties: optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials: ball mill, chemical vapor deposition, sol-gel, plasma arcing methods – Carbon nanotubes (CNT) and properties – Applications of nanomaterials.

Text Books:

1. Engineering physics – K. Thyagarajan, MacGraw Hill Publishers, 2013.
2. Engineering Physics – S. ManiNaidu, Pearson Education, I Edition, 2012.
3. Engineering physics – P.K. palanisamy, sciotech publisher, Edition, 2013.

Reference Books:

1. Engineering Physics – R.V.S.S.N. Ravi Kumar and N.V. Siva Krishna, Maruthi Publications, 2013
2. Engineering Physics – D.K. Battacharya and A. Bhaskaran, Oxford Higher Education I Edition, 2010.
3. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning, I Edition, 2012.

4. Engineering Physics – D.K.Bhattacharya and A.Bhaskaran, Oxford University press.
5. Engineering Physics – M. Arumugam, Anuradha Publications II Edition, 1997.
6. Engineering physics – M.N. Avadhanulu and P.G. KrshiSagar, Chand and Co, Revised Edi 2013.
7. Solid State Physics – A.J. Dekkar, McMillan Publishers, Latest edition, 2012.
8. Engineering Physics – Gaur and Gupta Dhanapati, RaiPublishers , 7th Edition, 1992.
9. Text book of Nanoscience and Nanotechnology: B S Murthy, P.Shankar, Baldev Raj B B Rath, James Murday, University Press, I Edition, 2012.

Course Outcomes:

The student is able to

- Understand basic principles of optics, optical engineering materials and incorporation of optics in engineering field.
- Identify different types of crystal structures in materials and x-ray diffraction through crystals.
- Know about importance of ultrasonic's in engineering field.
- Analysis of basic concepts of quantum mechanics and electron theory and consequences.
- Explain about basic mechanism of different types of advanced materials used in engineering field.
- Get brief idea about synthesis, properties and applications of nano materials.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. II Semester

**(5GC24) ENGINEERING MATHEMATICS – II
(Common to all branches)**

Course Objectives:

The course aims to provide the student with the ability

- To apply this knowledge to evaluate the multiple integrals in real life situations.
- To apply the knowledge of Laplace transforms and vector calculus for engineering problems

Unit I

Multiple integral: –Double integral – Evaluation - Change of Variables - Change of order of integration- Area and volumes using double integral. Triple integral - Evaluation.

Unit II

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Second shifting theorem– Laplace transform of Periodic functions – Inverse Laplace transform – Convolution theorem.

Unit III

Application of Laplace transforms to ordinary differential equations of first and second order.

Unit IV

Vector Calculus: Scalar and vector point functions, Gradient and its geometrical interpretation, Divergence –physical interpretation of divergence, Curl -physical interpretation of curl, Del applied twice to point functions, Line integral - Area, Surface and volume integrals.

Unit V

Vector Integral Theorems: Green's theorem – Stoke's theorem and Gauss's Divergence Theorem (without proofs) and their applications.

Text Book:

Higher Engineering Mathematics, B.S.Grewal, Khanna publishers- 43rdEdition (2014)

Reference Books:

1. Higher Engineering Mathematics, by Kreyszig.
2. A Text Book of Engineering Mathematics, B.V. Ramana, Tata McGraw Hill.
3. A Text Book of Engineering Mathematics, Vol – 1, T.K.V. Iyengar, B. Krishna Gandhi and others, S. Chand & Company.

Course Outcomes:

Upon completion of the course, students should be able to

- Understand the concepts of applications of integration.
- Have the knowledge of Laplace transforms and their applications.
- Master vector integral theorems.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. II Semester

(5G121) C PROGRAMMING AND DATA STRUCTURES

(Common to ALL branches)

Course Objectives:

- Structured programs when and how to use the appropriate statements available in the C language
- Write basic C programs using , Selection statements, Repetitive statements, Functions, Pointers, Arrays and Strings
- Implementation of C applications for data structures, sorting and searching.

Unit I

Pointers - Introduction, Features of Pointers, Pointer Declaration and Definition, Void Pointers, pointers for inter function communication, Pointers to Pointers, Pointer Applications: arrays and pointers, pointer arithmetic, Dynamic Memory Allocation, Pointers to Functions, pointer to void and command line arguments.

Unit II

Structures – Definition, initialization, accessing structures, nested structures, array of structures, structures and functions. Pointers and Structures. Unions. Sample programs

Files: Introduction to Streams and Files, Standard library input / output functions, formatted input / output functions, character input/output functions; Text verses binary Streams, Standard library functions for files. File examples.

Searching and Sorting - Exchange (Bubble) Sort, Selection Sort, Quick Sort, Insertion Sort, Merge Sort, Searching- Linear and Binary Search Methods.

Unit III

Data Structures: Overview of Data Structure. **Stack:** Representation of a Stack, Operation on a Stack, Implementation of a Stack using Arrays and Pointers, Representation of Arithmetic Expressions, Infix, Prefix, and Postfix Notations, Evaluation of Postfix Expression, Recursion.

Queues: Representation of Queue, Insertion, Deletion, Searching Operations, Circular Queues.

Unit IV

Linked List: Singly Linked List, Linked List with and without header, Insertion, Deletion and Searching Operations.

Doubly Linked List: Insertion, Deletion and Searching Operations.

Circular Linked List: Insertion, Deletion and Searching Operations.

Unit V

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

Graphs: Defining graph, basic terminology, graph representation.

Text Books:

1. C Programming and Data Structures. B.A. Forouzan, R. F. Gilberg, Cengage learning, Indian edition.
2. Programming in C and Data Structures, J.R. Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
3. Data Structures and Algorithms: Concepts, Techniques and Applications G.A.V. Pai [UNIT-V]

Reference Books:

1. C and Data Structures, A snapshot oriented treatise with live engineering examples, Dr. N.B. Venkateswarlu, Dr. E.V. Prasad, S. Chand.
2. LET US C, Yeswanth Kanitkar, Ninth Edition, BPB Publication.

Course Outcomes:

- Understand the purpose of pointers for parameter passing, referencing and dereferencing and understands the concepts of structures, unions and File management.
- Understand what and how to design data structure programs using C programming language.
- Understand how to solve applications like searching and sorting using C Programming language.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. I Semester

**(5G521) ENGINEERING MECHANICS-DYNAMICS
(Common to ME and CE)**

Course Objectives:

- This course will serve as a basic course by introducing the concepts of Basic mechanics which will help as a foundation to various courses.
- To teach the basic principles of particle and rigid body kinematics and kinetics. Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.

Unit I

KINEMATICS OF PARTICLES: Introduction, motion of particle, displacement, velocity and acceleration, Rectilinear motion, Rectilinear motion Along X-axis, Uniformly Accelerated motion, motion curves, rectilinear motion along vertical Y-axis

CURVILINEAR MOTION: introduction, rectangular coordinates, projectile motion, tangential and normal components of acceleration, radial and transverse components of acceleration.

Unit II

KINEMATICS OF RIGID BODIES: Introduction, rotational motion about a fixed axis, rotational motion with constant angular acceleration, rotational motion with constant angular velocity, relationship between angular and linear motions, general plane motion.

Unit III

KINETICS OF PARTICLES: Introduction, laws of motion, mass of bodies in rectangular coordinates, motion of connected bodies, D’alembert’s principle, variable acceleration, tangential and normal components of acceleration, Virtual work method.

Unit IV

WORK AND ENERGY: Introduction, work done by a force, work done by a variable force, work done in stretching a spring, power, energy, work done by internal forces, potential energy.

IMPULSE AND MOMENTUM: Introduction, impulsive force, impulse and momentum, non-impulsive force, impact of jet on plates or vanes.

Unit V

KINETICS OF RIGID BODIES: Introduction, system of particles, translational motion of a system of particles, rotational motion of system of particles, kinetic equations of motion for a rigid body, work energy method.

Text Books:

1. Engineering Mechanics-Statics and Dynamics, A.Nelson, Tata McGraw-Hill Company.
2. Engineering Mechanics, R.K Bansal - Laxmi Publications
3. Singer's Engineering Mechanics, B. Vijay kumarreddy – B.S. Publishers.
4. Engineering Mechanics, Bhavikatti and Rajasekharappa

Reference Books:

1. Engineering Mechanics by Timoshenko & young, Tata McGraw-Hill Company
2. Engineering Mechanics – B. Bhathacharya- Oxford University Publications
3. Engineering Mechanics –Arthur P. Boresi and Richard J. Schmidt. – Brooks/Cole – Cengage Learning
4. Engineering Mechanics-Statics & Dynamics—Johnson & Beer

Course Outcomes:

The students are able to

- Understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts).
- Understand basic dynamics concepts – force, momentum, work and energy
- Understand and be able to apply Newton's laws of motion.
- Understand and be able to apply other basic dynamics concepts - D'alembert's principle, the Work-Energy principle, Impulse-Momentum principle and the coefficient of restitution.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. I Semester

**(5G522) ENGINEERING GRAPHICS – II
(Common to ME and CE)**

Course Objectives:

- To impart and inculcate proper understanding of the theory of projections of solids and simple machine components.
- Able to visualize projections of solids with sectioning, isometric views and orthographic views.
- To prepare the student for future engineering positions.

Unit I

PROJECTIONS OF SOLIDS: Projections of Regular Solids – Cylinder, Cone, Prism and Pyramid - inclined to one reference plane & both reference planes – Auxiliary Views.

Unit II

SECTIONS OF SOLIDS: Section Planes and Sectional views of Right Regular Solids–Prism, Cylinder, Pyramid and Cone. True shapes of the sections.

Unit III

DEVELOPMENT OF SURFACES: Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid, Cone and their Sectioned parts.

INTERPENETRATION OF RIGHT REGULAR SOLIDS: Projections of curves of Intersection of Cylinder Vs Cylinder - Cylinder Vs square prism – Cylinder Vs Cone and Square prism Vs Square prism (Axis bisecting problems only).

Unit IV

ISOMETRIC PROJECTIONS / VIEWS: Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids.

Unit V

CONVERSION OF VIEWS: Conversion of Isometric views to Orthographic Views and Conversion of Orthographic views to Isometric views.

Text Books:

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

Reference Books:

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

Course Outcomes:

- Comprehend general projection theory, with an emphasis on the use of orthographic projection to represent three-dimensional objects in two-dimensional views.
- Able to apply auxiliary or sectional views to most practically represent engineered parts.
- Can employ freehand 3D pictorial sketching to aid in the visualization process and to efficiently communicate ideas graphically.
- Analyze a drawing and bring out any inconsistencies to put forth inferences graphically.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. II Semester

**(5GC26) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB - II
(Common to all branches)**

Course Objectives:

- To enable a learner sharpen his public speaking skills
- To expose the students to a varied blend of self-instructional, learner-friendly modes of language learning
- To enable the student learn better pronunciation through emphasis on word accent, intonation, and rhythm

The following course content is prescribed for the **English Language Laboratory** sessions:

1. Introduction to Stress and Intonation
2. 'Just A Minute' (JAM)
3. Oral Presentations
4. Information Transfer

Manual cum Record, prepared by the Faculty Members of English of the college will be used by Students.

Minimum Requirements:

The English Language Lab shall have two parts:

- **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
- **The 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.

Suggested Software:

- Sky Pronunciation Suite
- Connected Speech from Clarity
- Clarity Pronunciation Power – Part I
- Language in Use, Foundation Books Pvt Ltd with CD
- Learning to Speak English - 4 CDs
- Cambridge Advanced Learners' English Dictionary with CD.
- Murphy's English Grammar, Cambridge with CD

Course Outcomes

- The student will enhance his skills to make a presentation confidently
- The student will learn how to neutralize his accent
- The student will be able to decipher information from graphics and describe it professionally

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. II Semester.

**(5GC28) ENGINEERING PHYSICSLAB
(Common to CSE, IT, ME and CE)**

Course Objectives:

- The student will be able to handle and understand different apparatus to perform experiments.
- The student will learn practical measurement of different physical quantities.
- The student will be able to characterize the materials and their properties.
- The student will be allowed to learn practical experience of theory conceptual values.

LIST OF EXPERIMENTS

Any 10 of the following experiments has to be performed

1. Determination of wavelengths of various colors of mercury spectrum using diffraction grating in normal incidence method
2. Determination of dispersive power of the prism
3. Determination of thickness of thin object by wedge method
4. Determination of radius of curvature of lens by Newton's Rings
5. Laser : Diffraction due to single slit
6. Laser : Diffraction due to double slit
7. Laser: Determination of wavelength using diffraction grating
8. Determination of Numerical aperture of an optical fiber
9. Meldi's experiment: Determination of the frequency of tuning fork
10. Determination of particle size by using laser.
11. Energy gap of a material using p-n junction diode
12. Hall effect : Determination of mobility of charge carriers in Semiconductor
13. B-H curve
14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
15. Determination of rigidity modulus –Torsional pendulum

Manual cum Record:

Prepared by Engineering Physics Faculty Members of Annamacharya Institute of Technology and Sciences.

Reference Books:

1. Engineering Physics Practicals – Dr. B. Srinivasa Rao V.K.V. Krishna K.S Rudramamba
2. Engineering Practical Physics – S.L Kakani& Shubra Kakani

Equipment Required:

- Spectrometers
- Microscopes
- Melde's apparatus
- Stewart-Gee's apparatus
- Torsional pendulum
- Light sources
- Optical fiber cables

Course Outcomes:

- The student would be confident in handling apparatus to perform experiments.
- The student would have developed practical skill.
- The student would have knowledge in practical values and applications

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. II Semester

**(5G123)PROGRAMMING IN C AND DATA STRUCTURES LAB
(Common to ECE, EEE, ME and CE)**

Course Objectives:

- To make the student learn a programming language.
- To teach the student to write programs in C to solve the problems.
- To introduce the student to simple linear data structures such as lists, stacks, queues.

Recommended Systems/Software Requirements:

Intel based desktop PC with ANSI C/ TURBO C Compiler and Supporting Editors

Exercise 1

Minimum of 4 Programs on pointer basics [declaration, A, Pointers, pointers for inter function communication.

Exercise 2.

Minimum of 4 Programs on Pointers applications.

Exercise 3

Minimum of 4 programs on structures and unions

Exercise 4

Minimum of 4 programs on basic File operations.

Exercise 5

Minimum of 4 programs on searching and sorting techniques .

Exercise 6

Implementation of Stack and perform all Stack operations using

- i) Arrays
- ii) Pointers

Exercise 7

Implementation of Queue and perform all Queue operations using

- i) Arrays
- ii) Pointers

Exercise 8

Implement Circular Queue (its operations) using

- i) Arrays
- ii) Pointers

Exercise 9

Implementation of Single Linked List and its operations using

- i) Arrays
- ii) Pointers

Exercise 10

Implementation of Double Linked List and its operations using

- i) Arrays
- ii) Pointers

Exercise 11

Implementation of Circular Linked List and its operations using

- i) Arrays
- ii) Pointers

Exercise 12

C program that uses Stack operations to perform the following:

- i. Converting infix expression into postfix expression
- ii. Evaluating the postfix expression

Exercise 13

Implement Binary Tree using Double Linked List and its operations.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. II Semester

**(5G124) I.T. WORKSHOP
(Common to CE and ME)**

Course Objectives:

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To learn about Networking of computers and use Internet facility for Browsing and Searching.

Preparing your Computer

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

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

Task 3: Install Operating System: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: Operating System Features: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet

Task 5: Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimping activity, logical configuration etc should be done by the student. The entire process has to be documented.

Task 6: Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc. If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating

system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating e-mail account.

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools

Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 9: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 10: Presentations: creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper linking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Optional Tasks:

Task 11: Laboratory Equipment: Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine

- Generators
- Construction material
- Air conditioner
- UPS and Inverter
- RO system
- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

Task 12: Software: Students may submit a report on specifications of various software that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. The software may be proprietary software or Free and Open source software. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop operating system
- Server operating system
- Antivirus software
- MATLAB
- CAD/CAM software
- AUTOCAD

Reference Books:

1. Introduction to Computers, Peter Norton, Mc Graw Hill
2. MOS study guide for word, Excel, Powerpoint & Outlook Exams”, Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, IITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, maintaining & Repairing PCs”, Bigelows, TMH

Course Outcomes:

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B.Tech. I Semester

**(5GC31) ENGINEERING MATHEMATICS – III
(Common to CE & ME)**

Course Objectives:

- This course aims at providing the student with the concepts of Matrices, Numerical differentiation and Numerical integration, Numerical solution of ordinary differential equations, Fourier series, partial differential equations, complex variables and complex integrations which find the applications in engineering.
- Our emphasis will be more on the logical and problem solving development in the Numerical methods and its applications.

Unit I

Rank – Echelon form Solution of Linear System of Homogenous and Non Homogeneous equations- Eigen values-Eigen vectors-properties, Cayley -Hamilton theorem-inverse and powers of a matrix by Cayley Hamilton theorem.

Unit II

Solution of algebraic and transcendental equations-Bisection method-Method of false position-Newton- Raphson method-Interpolation-Forward differences-Backward differences-Newton's forward and backward difference formulae – Lagrange's interpolation formula.

Numerical Differentiation-Numerical integration-Trapezoidal Rule-Simpson's one third Rule-Simpson's $3/8^{\text{th}}$ Rule (without proofs).

Unit III

Numerical solutions of ordinary differential equations-Taylor's series-Euler's method-Picard's method- Runge-kutta fourth order method-Milne's predictor-corrector method (Without proofs).

Unit IV

Fourier series-Determination of Fourier coefficients-Fourier series-Even and Odd functions-Fourier series in an arbitrary interval-even and odd periodic continuation-Half –range Fourier sine and cosine expansions.

Partial differential equations: Formation of partial differential equations by eliminating arbitrary constants and functions--Method of separation of variables

Unit V

Functions of complex variable –continuity-differentiability-Analyticity-Properties-Cauchy Riemann equations in Cartesian and polar co-ordinates(without proofs).Harmonic and conjugate harmonic functions-Milne-Thomson's method.

Complex integration: Cauchy's integral theorem-Cauchy's integral formula-Generalized integral formula (without proofs).

Text Books:

1. Higher Engineering Mathematics, B. S. Grewal, 40th Edition, Khanna Publishers, New Delhi.
2. A text book of Mathematical Methods, E. Keshava Reddy, and G. Sankara Rao, I. K. International.

Reference Books:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 8th Edition, New Age International (Pvt) Limited.
2. A text book of Engineering Mathematics, B. V. Ramana, Tata McGraw Hill.
3. Mathematics - II, T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
4. Mathematics - III, E. Keshav Reddy and Rukmangadachari, Pearson Education.

Course Outcomes:

- The student becomes familiar with the application of Mathematical techniques like Fourier series.
- The student gains the knowledge to tackle the engineering problems using the concepts of Fourier series, Partial differential equations and Numerical Methods.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B. Tech. I Semester

(5G538) ELECTRICAL & MECHANICAL TECHNOLOGY

Course Objectives:

- In this course the different types of DC generators and motors, Transformers, 3 Phase AC
- Machines which are widely used in industry are covered and their performance aspects will be studied.

In end examination minimum of two questions from each **Part-A & Part-B** should be chosen for answering **FIVE** questions. All questions carry equal marks.

Use separate booklets for Part-A & Part-B

PART –A

ELECTRICAL TECHNOLOGY

Unit I

ELECTRICAL CIRCUITS & DC MACHINES: Electric current, Potential Difference, Power, Energy, Ohm's law, Kirchoff's laws, RLC elements, Principle of Operation of DC Generator & Motor, Construction, Types-Applications.

Unit II

AC MACHINES: Principle of operation of 1- ϕ Transformers, Losses, Efficiency, Regulation, Principle of operation of 3- ϕ Induction motor Expression for Torque, Torque-slip Characteristics, Operation of Alternators, Applications.

PART –B

MECHANICAL TECHNOLOGY

Unit III

WELDING PROCESSES: Introduction to welding - classification of welding processes - Arc welding and gas welding – Equipment, welding fluxes and filler rods – Submerged arc welding, TIG and MIG processes.

Unit IV

INTERNAL COMBUSTION ENGINES : Introduction, Classification and Main components of IC Engines – Working principle of petrol and diesel engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Lubrication and fuel systems of petrol and diesel engines.

AIR COMPRESSORS AND EARTH MOVING MACHINERY: Working principles of air compressors – Reciprocating air compressor: single and multi stage compression.

Unit V

REFRIGERATION AND AIR CONDITIONING: Terminology of refrigeration and air conditioning – Refrigerants and their desirable properties – Methods of refrigeration: Vapour compression and vapour absorption systems - Basic principles of air conditioning – Room air conditioning systems - Comfort air conditioning systems.

Text Books:

1. Electrical Technology by B.L.Thareja, S.Chand Publishers.
2. Introduction to Electrical Engineering - M.S Naidu and S. Kamakshaiah, Tata McGraw-Hill Publications Ltd., New Delhi, 2009.
3. Mechanical Technology by R.S. Khurmi.
4. Mechanical Technology by Kodandaraman C.P.
5. Construction Planning; Equipment and Methods – Peurifoy.

Course Outcomes:

After the completion of the course, the student should be able

- To predict the behaviour of electrical circuits.
- To identify the type of electrical machine used for that particular application.
- To identify various electronic devices and CRO parts.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B. Tech. I Semester

(5G631) STRENGTH OF MATERIALS – I

Course Objective:

- The subject provides the knowledge of simple stress strains flexural stresses in members, shear stresses and deflection in beams so that the concepts can be applied to the Engineering problems.

Unit I

SIMPLE STRESSES AND STRAINS:-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.

Unit II

SHEAR FORCE AND BENDING MOMENT: Definition of beam–Types 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, uniformly distributed loads, uniformly varying loads and combination of these loads– Point of contra flexure –Relation between S.F, B.M and rate of loading at a section of a beam.

Unit III

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 Angle and 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 angle sections.

Unit IV

DEFLECTION OF BEAMS 1: Bending into a circular arc– slope, deflection and radius of curvature –Differential equation for the elastic line of a beam – Double integration and Macaulay’s methods.

DEFLECTION OF BEAMS 2: Determination of slope and deflection for cantilever and simply supported beams subjected to point loads,-U.D.L. Uniformly varying load.-Mohr’s theorems –Moment area method– application to simple cases including overhanging beams – deflections of propped cantilevers for simple loading cases .

Unit V

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.

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. Grawhill Publications 2000.
2. Strength of Materials by Schaum’s outline series –Mc.Grawhill International Editions.
3. Strength of Materials by S. Ramakrishna and R. Narayan– Dhanpat Rai Publications.
4. Strength of materials by R. K. Rajput, S. Chand & Co, New Delhi.
5. Strength of Materials by L.S.Srinathetal., Macmillan India Ltd., Delhi.
6. Strength of Materials by BhaviKatti.

Course Outcomes:

- The students would be able to understand the behavior of materials under different stress and strain conditions.
- The students would be able to draw bending moment, shear force diagram, bending stress and shear stress distribution for beams under the different conditions of loading.
- The student would be able to apply knowledge to analyse concept of deflection, bending moment and shear force diagram in beams, frames, trusses and columns under various loading conditions using different analysis methods.
- The student would be able to apply knowledge to determine forces in determinate and indeterminate structures by the force and matrix method.
- The students would be able to perform ILD analysis of determinate beams and trusses.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B. Tech. I Semester

(5G632) SURVEYING

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 I

LINEAR MEASUREMENTS AND CHAIN SURVEYING: 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.

Unit II

LEVELING AND CONTOURING: 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 .

Unit III

THEODOLITE: 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.

Unit IV

PLANE TABLE SURVEYING: Plane Table Survey: Components – Setting – Methods – Radiation– Traversing - Intersection and Resection

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.

Unit V

CURVES: 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 , basic concepts & total station .

Text Books:

1. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Surveying - Vol. I, II and III, 15th Edition, Laxmi Publications (P) Ltd., New Delhi, 2010.
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, 1st Edition, 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

- The students would be able to do temporary and permanent adjustments.
- The students would be able to measure distances and angles.
- The students would be able to orient and draw the various maps.
- The students would be able to calculate areas and volumes of the earth work.
- The student would be able to undertake various civil engineering surveys and convert the data into usable forms.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B. Tech. I Semester

(5G633) FLUID MECHANICS

Course Objective:

- This subject introduces the basic concepts of fluids, their behavioural properties, analyzing the fluid flows using primary equations. This subject further deals with various flow measuring devices and concepts of boundary layer flows.

Unit I

PROPERTIES OF FLUIDS AND PRESSURE MEASUREMENTS: Dimensions and units – Physical properties of fluids – Mass density-specific weight- specific volume- specific gravity - ideal and real fluids-Newtonian and non-Newtonian fluids – Viscosity - Surface tension -Vapour pressure and their influences on fluid motion - Pressure at a point - Pascal's law - Hydrostatic law - Atmospheric, gauge and absolute pressures - Measurement of pressure - Pressure gauges – Manometers - Differential and micro manometers.

HYDROSTATIC FORCES: Hydrostatic forces on submerged plane surfaces – Total pressure and centre of pressure on plane and curved surfaces – Calculation of total pressure from pressure diagrams.

Unit II

FLUID KINEMATICS : Description of fluid flow - Stream line – Path line and streak lines - Stream tube - Classification of flows - Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one dimensional flows – stream and velocity potential functions - Flow net and its uses.

FLUID DYNAMICS: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line – Momentum equation and its application – Momentum and kinetic Energy correction factors – Forces on pipe bend.

Unit III

CLOSED CONDUIT FLOW: Major loss- Darcy Weisbach equation - Minor losses – Pipes in series – Pipes in parallel – Total energy line and hydraulic gradient line - Pipe network problems -Variation of friction factor with Reynolds's number – Moody's chart.

MEASUREMENT OF FLOW: Pitot tube - Venturimeter and orifice meter – Orifices and mouthpieces - Rectangular, triangular and trapezoidal notches – Broad crested weirs.

Unit IV

LAMINAR AND TURBULENT FLOW: Reynold's experiment -Characteristics of laminar and turbulent flows – Laminar flow through circular pipes - Flow between parallel plates – Hydro dynamically smooth and rough boundaries.

Unit V

HYDRAULIC SIMILITUDE: Dimensional analysis - Rayleigh's method and Buckingham's pi theorem - Model studies – Geometric, kinematic and dynamic similarities - Dimensionless numbers – Model laws – Scale effects.

Text Books:

1. P.N. Modi and S.M. Seth, Hydraulics and Fluid Mechanics, 18th Edition, Standard Book House, Delhi, 2011.
2. R.K. Bansal, Fluid Mechanics and Hydraulic Machines, 9th Edition, Laxmi Publishers, New Delhi, 2011.

Reference Books:

1. R.K. Rajput, Fluid Mechanics and Hydraulic Machinery, 4th Edition, S. Chand Publishers, New Delhi, 2010.
2. J.F. Douglas, J.M. Gaserek and J.A. Swaffird, Fluid Mechanics, 5th Edition, Longman, 2010.
3. A.K. Mohanty, Fluid Mechanics, 2nd Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
4. S.K. Som and G. Biswas, Introduction to Fluid Machines, 2nd Edition, TataMcGraw-Hill Publishers Pvt. Ltd, 2010.

Course Outcomes:

- The students should be able to operate the equipment according to its working principles.
- The students should be able to take the observations for evaluating equipment performance.
- The students should be able to find out the hydraulic coefficients of equipment's.
- The students should be able to select the equipment's as per requirements to solve practical problems.
- The students should be able to analyse the experimental and theoretical performance of equipment's.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B. Tech. I Semester

(5G634) BUILDING MATERIALS AND CONSTRUCTION

Course Objective:

- To give the students a basic idea about the construction materials, building components and to introduce component methodologies.

Unit I

STONES AND 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.

Unit II

ROOFING MATERIALS Characteristics of good tile – manufacturing methods, Types of tiles. Use of Materials like aluminium, gypsum, glass and bituminous materials – their quality.

LIME & CEMENT : Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime, various ingredients of cement ,types of cement .

Unit III

WOOD: Structure – properties – Seasoning of timber. Classification of various types of woods used in buildings – Defects in timber. Alternative materials for wood, Galvanized Iron, Fiber-reinforced plastics, steel, Aluminium

Unit IV

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

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

Unit V

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.

Text Books:

1. Building material by S K Duggal – New Age International Publishers; Second Edition.
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.
3. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.
4. Building materials by R.S.Rangwala, Charotar publications

Reference Books:

1. R.Chudly “Construction Technology “– Volumes I and II” 2nd Edition, Longman, UK, 1987.
2. Building materials by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.

Course Outcomes

- Student would have a basic knowledge about the planning of the residential as well as public building.
- Student would have knowledge of preparation of the working drawing.
- Student will be able to prepare of submission drawing according to the local bylaws.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B. Tech. I Semester

**(5GC35) APTITUDE AND REASONING SKILLS
(Common to CE, ME & CSE)**

Quantitative Aptitude:

Number Systems, Averages, Problems on ages, Allegations, Percentages, Profit and loss, Simple interest and Compound interest, Ratio and Proportion and variation, Time and Work, Time and Distance, Mensuration, Permutation and Combinations.

Progressions, Inequalities, Logarithms, HCF and LCM, Decimal Fractions, Simplification, Square Roots and Cube Roots, Pipes and Cisterns, Area, Volume and Surface Areas, Calendar, Clocks, True Discount, Banker's Discounts, Data Interpretation– Tabulation, Bar Graphs, Pie charts, Line Graphs

Reasoning:

Directions, Blood Relations, Problems on Cubes, Series and Sequences, Odd man out, Coding and Decoding, Data sufficiency, Logical deductions, Arrangements and Combinations, Groups and Teams, Puzzles to Puzzle you. More puzzles, Brain Teasers, Puzzles and Teasers

Text Books:

1. R.S. Agarwal, Quantitative Aptitude, S. Chand Publishers, New Delhi, 2005.
2. R.S. Agarwal, Verbal and Non-Verbal Reasoning, S. Chand Publishers, New Delhi, 1998.

Reference Books:

1. Arun Sharma, How to Prepare for Quantitative Aptitude, TMH Publishers, New Delhi, 2003.
2. Sharon Weiner-Green, IrnK. Wolf, Barron's GRE, Galgotia Publications, New Delhi, 2006.
3. Shakuntala Devi, Puzzles to Puzzle you, Orient Paper Backs Publishers(OPB), New Delhi, 2005.
4. Shakuntala Devi, More Puzzles, OPB, New Delhi, 2006.
5. Ravi Narula, Brain Teasers, Jaico Publishing House, New Delhi, 2005.
6. George J Summers, Puzzles and Teasers, Jaico Publishing House, Mumbai, 2005.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B.Tech. I Semester

(5G635) SURVEYING LAB – I

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 EXERCISES:

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. Surveying of a given area by prismatic compass (closed traverse) 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. Traversing by plane table survey
8. Fly leveling (differential leveling)
9. An exercise of L.S and C.S and plotting
10. Two exercises on contouring.
11. Study of Theodolite in detail - practice for measurement of horizontal and vertical angles.
12. Measurement of horizontal angles by method of repetition and reiteration.

ANY OF THE EIGHT EXPERIMENTS ARE MANDATORY

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B. Tech. I Semester

(5G636) STRENGTH OF MATERIALS LAB

Course Objective:

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

LIST OF EXPERIMENTS

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

ANY OF THE EIGHT EXPERIMENTS ARE MANDATORY

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B. Tech. II Semester

**(5GC42) PROBABILITY AND STATISTICS
(Common to CE and ME)**

Course Objective:

- To help the students in getting a thorough understanding of the fundamentals of probability and usage of statistical techniques like testing of hypothesis, ANOVA, Statistical Quality Control and Queuing theory

Unit I

PROBABILITY MATHEMATICAL EXPECTATIONS: Introduction to Probability : Definition of random experiment, events and sample space – Definition of probability – Addition and multiplication theorems - Conditional probability – Baye’s theorem – Simple problems on Baye’s theorem.

RANDOM VARIABLE: Discrete and continuous random variables -Distribution function of random variable – Properties – Probability mass function - Probability density function – Mathematical expectation – Properties of mathematical expectations – Mean and variance.

Unit II

PROBABILITY DISTRIBUTIONS : Discrete Distributions : Binomial distribution – Mean and standard deviations of Binomial distribution – Poisson distribution – Mean and standard deviations of Poisson distribution – Applications. Continuous Probability Distributions: Uniform distribution – Exponential distribution – Normal distribution – Properties of normal distribution – Importance of normal distribution – Area properties of normal curve.

CORRELATION AND REGRESSION:

Correlation: Definition - Measures of correlation – Correlation for bivariate distribution – Rank correlation coefficients. Regression: Simple linear regression – Regression lines and properties.

Unit III

SAMPLING DISTRIBUTIONS : Population and sample – Parameter and Statistic – Sampling distribution of statistic – Standard error of statistic – Null and alternative hypotheses – Type I and II errors – Level of significance – Critical region –Degrees of freedom.

LARGE SAMPLES TEST OF SIGNIFICANCE: Test of significance for single proportion – Test of significance for difference of proportions- Test of significance for a single mean - Test of significance for difference of means – Test of significance for difference of standard deviations.

Unit IV

SMALL SAMPLES TEST OF SIGNIFICANCE: Student’s t-test – F-test for equality of population variance – Chi-square test of goodness of test – Contingency table – Chi-square test for independence of attributes.

Unit V

STATISTICAL QUALITY CONTROL: Introduction – Advantages and limitations of statistical quality control – Control charts – Specification limits - , R, np and c charts.

QUEUING THEORY: Queuing theory – Pure birth and death process – M/M/1 Model – Problems.

Text Books:

1. T.K.V. Iyengar, B. Krishna Gandhi and Others, Probability and Statistics, 3rd Edition, S. Chand Group, New Delhi, 2011.
2. Shahnaz Bathul, A Text Book of Probability and Statistics, 2nd Edition, Ridge Publications, Hyderabad.
3. Kandaswamy and Tilagavathy, Probability Statistics and Queuing Theory, 1st Edition, S. Chand Group, New Delhi, 2004.

Reference Books:

1. Miller and John E. Freund, Probability and Statistics for Engineers, 7th Edition, Pearson Higher Education, 2010.
2. Ronald E. Walpole, Probability and Statistics for Engineers and Scientists, 8th Edition, Pearson Education India, New Delhi, 2007.
3. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical

Course Outcome:

- The student will be able to analyze the problems of engineering & industry using the techniques of testing of hypothesis, ANOVA, Statistical Quality Control and Queuing theory and draw appropriate inferences

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B. Tech. CE II Semester

(5GC43) ENVIRONMENTAL SCIENCE

(Common to CE, ME and CSE)

Course Objective:

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

Unit I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: Scope & Importance of environmental studies - Need for public awareness - Global environmental crisis (over-exploitation of natural resources, decline of ecosystems, loss to biodiversity, environmental pollution, and population growth) – People in environment – Institutions in environment

Unit II

RENEWABLE & NON-RENEWABLE NATURAL RESOURCES: Forest resources: Use – deforestation, case studies - dams & their effects on forest & tribal people Water resources: Use - floods, drought- conflicts over water. Mineral resources: Use - environmental effects of extracting mineral resources, case studies. Food resources: Impacts of over grazing, traditional agriculture and modern agriculture, Energy resources: Renewable and non – renewable energy resources - use of alternate energy resources. Land resources: Land as a resource, land degradation, soil erosion. Role of an individual in the conservation of natural resources.

Unit III

ECOSYSTEMS: Producers, consumers & decomposers - Food chains, food webs & ecological pyramids - Energy flow in the ecosystem- Cycling of nutrients (Bio geo chemical cycles-water, oxygen, carbon, nitrogen & energy cycles) – Types and characteristic features of the following ecosystems :(a)Forest ecosystems (b) Grass land ecosystems (c) Desert ecosystems (d) Aquatic ecosystems (lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION: Definition - Values of biodiversity: consumptive value, productive value, social value, ethical value, aesthetic value & option values - Hot spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wild life - Conservation of biodiversity: In – situ & Ex-situ conservation

Unit IV

ENVIRONMENTAL POLLUTION: Definition, causes, effects & control measures of: Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Marine pollution, Nuclear hazards - Solid waste management: Causes, effects and control measures of urban wastes.

Unit V

SOCIAL ISSUES AND THE ENVIRONMENT: Rain water harvesting - Environmental ethics: Issues & possible solutions - Global warming - Acid rain - Ozone layer depletion – Wasteland reclamation - Environment protection Act.-Air (Prevention & Control of Pollution) Act.-Water (Prevention & Control of Pollution) Act.-Wildlife Protection Act-Forest Conservation Act.

HUMAN POPULATION & ENVIRONMENT: Population explosion – Family Welfare Program -Environment & human health - Human Rights (in relation to environment) - Value Education (environmental values) - HIV/AIDS.

Text Books:

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, University press.
2. Environmental Studies by R. Rajagopalan Oxford University Press.
3. Perspectives In Environmental Studies by Anubha Kaushik and C.P.kaushik, New Age International Publishers.

Reference Books:

1. Comprehensive Environmental Studies by J.P.Sharma, Laxmi Publications.
2. Environmental Studies by Anindita Basak – Pearson education.
3. Environmental Studies by Benny Joseph, Mc.GrawHill Publications.

Course Outcomes:

- The students would have knowledge of characteristics of water, drinking water standards and necessity of treatment.
- The students would be able to understand the various unit operations and unit processes in water treatment and flow sheet of conventional municipal water treatment plant.
- The students would be able to design various units of municipal conventional water treatment plant.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B. Tech. II Semester

(5G641) STRENGTH OF MATERIALS – II

Course Objective:

- Study of the subject provides the understanding of principal stress, strains, springs, columns and structures.

Unit I

THIN CYLINDERS: Thin seamless cylindrical shells –Derivation of formula for longitudinal and circumferential stresses– hoop, longitudinal and Volumetric strains– changes in diameter, and volume of thin cylinders –Thin spherical shells.

THICK CYLINDERS: Introduction Lamé's theory for thick cylinders – Derivation of Lamé's formulae– distribution of hoop and radial stresses across thickness– design of thick cylinders –compound cylinders–Necessary difference of radii for shrinkage– Thick spherical shells.

Unit II

TORSION OF CIRCULAR SHAFTS: Theory of pure torsion– Derivation of Torsion equations: $T/J = q/r = N\theta/L$ – Assumptions made in the theory of pure torsion –Torsional moment of resistance–Polar section modulus– Power transmitted by shafts –Combined bending and torsion and end thrust–Design of shafts according to theories of failure.

SPRINGS: Introduction– Types of springs–deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel– Carriage or leaf springs.

Unit III

COLUMNS AND STRUTS: Introduction– Types of columns –Short, medium and long columns– Axially loaded compression members– Crushing load –Euler's theorem for long columns- assumptions- derivation of Euler's critical load formulae for various end conditions–Equivalent length of a column –slenderness ratio–Euler's critical stress –Limitations of Euler's theory– Rankine (Gordon) formula –Long columns subjected to eccentric loading –Secant formula– Empirical formulae – Straight line formula –Prof. Perry's formula.

Unit IV

DIRECT AND BENDING STRESSES:Stresses under the combined action of direct loading and B.M., core of a section –determination of stresses in the case of chimneys, retaining walls and dams –conditions for stability – stresses due to direct loading and B.M. about both axis.

Unit V

UNSYMMETRICAL BENDING: Introduction– Graphical method for locating principal axes –Moments of inertia referred to any set of rectangular axes– Stresses in beams subjected to unsymmetrical bending –Principal axes– Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis - Deflection of beams under unsymmetrical bending, concept shear center for high channel.

TextBooks:

1. A Textbook of Strength of materials by R. K. Bansal –Laxmi Publications (P) Ltd., New Delhi.
2. Strength of Materials by S.S. Bhavikatti – Vikas Publishers
3. Strength of Materials by B.C.Punmia

Reference Books:

1. Mechanics of Solids, by Ferdinand p Beer and others– Tata Mc.Grawhill Publications2000.
2. Strength of Materials by Schaum’s outline series –Mc.Grawhill International Editions.
3. Strength of Materials by S.Ramakrishnaand R.Narayan– Dhanpat Rai publications.
4. Strength of materials by R.K.Rajput, S.Chand & Co, NewDelhi.
5. Strength of Materials by A.R.Basu, Dhanpat Rai & Co, Nai Sarah,NewDelhi..
6. Mechanics of Structures, by S.B.Junnarkar, Charotar PublishingHouse, Anand,Gujrat.

Course Outcomes:

- The students would be able to draw bending moment, shear force diagram, bending stress and shear stress distribution for beams under the different conditions of loading.
- The student would be able to apply knowledge to analyse concept of deflection, bending moment and shear force diagram in beams, frames, trusses and columns under various loading conditions using different analysis methods.
- The student would be able to apply knowledge to determine forces in determinate and indeterminate structures by the force and matrix method.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B. Tech. II Semester

(5G642) HYDRAULICS AND HYDRAULIC MACHINERY

Course Objective:

- The main objective of this course is to deal with the concepts of flow through open channels and their applications and the principles of hydraulic machines and hydraulic models.

Unit I

BOUNDARY LAYER THEORY: Boundary layer concepts – Thickness of boundary layer - Characteristics of boundary layer along a thin flat plate - Vonkarmen momentum integral equation - Laminar and turbulent boundary layers (no derivation) - Laminar sub-layer separation of boundary layer - Control of boundary layer- Flow around submerged objects – Drag and lift - Magnus effect.

Unit II

OPEN CHANNEL FLOW - I: Types of flows – Types of channels – Velocity distribution – Chezy's, Manning's and Bazin's formulae for uniform flow – Most Economical sections - Critical flow – Specific Energy - Critical depth – Computation of critical depth – Critical, sub-critical and super critical flows – Velocity measuring instruments.

OPEN CHANNEL FLOW - II: Non uniform flow - Dynamic equation for gradually varied flow - Mild, critical, steep, horizontal and adverse slopes - Surface profiles - Direct step method – Rapidly varied flow - Hydraulic jump and its applications - Energy dissipation.

Unit III

IMPACT OF JETS: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - Series of vanes - Jet striking centrally and at tip - Velocity triangles at inlet and outlet – Expressions for work done and efficiency - Applications to radial flow turbines.

Unit IV

HYDRAULIC TURBINES – I: 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 – Runaway speed - Draft tube theory, function and efficiency.

HYDRAULIC TURBINES – II: Governing of turbines - Surge tanks - Unit quantities and specific speed – Performance characteristics -Geometric similarity - Cavitation, causes, effects.

Unit V

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.

HYDROPOWER ENGINEERING: Classification of hydropower plants – Load factor - Utilization factor - Capacity factor – Estimation of hydropower potential.

Text Books:

1. P.N. Modi and S.M. Seth, Hydraulics and Fluid Mechanics, 18th Edition, Standard Book House, Delhi, 2011.
2. K, Subramanya, Flow in Open Channels, 3rd Edition, Tata McGraw-Hill Publishers, New Delhi, 2010.
3. D.S. Kumar, Fluid Mechanics and Fluid Power Engineering, 7th Edition, Kataria and Sons, Delhi, 2009.
4. R.K. Bansal, Fluid Mechanics and Hydraulic Machines, 9th Edition, Laxmi Publishers, NewDelhi, 2011.

Reference Books:

1. Ranga Raju, Flow Through Open Channels, 7th Edition, Tata McGraw-Hill Publications, New Delhi, 2009.
2. R.K. Rajput, Fluid Mechanics and Hydraulic Machinery, 4th Edition, S. Chand Publishers, New Delhi, 2010.
3. V.T .Chow, Open Channel Flow, McGraw-Hill Publishers, New Delhi, 1996.
4. Banga and Sharma, Hydraulic Machines, 7th Edition, Khanna Publishers, New Delhi, 2007.
5. M.M. Dandekar and K.N. Sharma, Water Power Engineering, 1st Edition, Vikas Publishing House, New Delhi, 2009.

Course Outcomes

- The students should be able to understand and apply the basic concept of laminar flow of fluid, boundary layer and its types in solving the practical problems.
- The students should be able to understand the hydraulics of flow in smooth and rough pipe, concept of frictional resistance to flow, series, parallel & branched pipes flow looped network analysis using Hardy-Cross and water hammer pressure due to sudden closure of valve.
- The students should be able to apply the basic to analyze and apply of geometrical properties, critical flow, uniform flow, specific energy in open channel flow.
- The students should be able to understand and apply the gradually varied flow in open channel flow.
- The students should be able to understand and apply the rapidly varied flow in open channel flow.
- The students should be able to understand and apply concept of hydraulic jump in open channel flow.
- The students should be able to know the constructional details, heads and working principles of pumps
- The students should be able to know the constructional details, heads and working principles of turbines.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B. Tech. II Semester

(5G643) STRUCTURAL ANALYSIS - I

Course Objectives:

- To make the students to understand the principles of analysis of structures of static and moving loads by various methods.

Unit I

FIXED BEAMS – Introduction to statically indeterminate beams with U.D.L, central point load, 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.

Unit II

CONTINUOUS BEAMS: Introduction-Clapeyron's theorem of three moments-Analyses 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.

Unit III

SLOPE-DEFLECTION METHOD: 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.

Unit IV

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, Bending moment and shear forces-Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

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.

Unit V

INFLUENCE LINES: 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.

INDETERMINATE STRUCTURAL ANALYSIS: 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.

Text Books:

1. Analysis of Structures-Vol I & Vol II by V.N. Vazirani & M.M. Ratwani, Khanna Publications, New Delhi.
2. Structural Analysis by V.D. Prasad Galgotia publications, 2nd Editions.
3. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi
4. Comprehensive Structural Analysis-Vol. I & 2 by 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; Tata 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, New Delhi.
5. Introduction to structural analysis by B.D. Nautiyal, New age international publishers, New Delhi.

Course Outcomes

- The students would be able to understand the behavior of materials under different stress and strain conditions.
- The students would be able to draw bending moment, shear force diagram, bending stress and shear stress distribution for beams under the different conditions of loading.
- The student would be able to apply knowledge to analyse concept of deflection, bending moment and shear force diagram in beams, frames, trusses and columns under various loading conditions using different analysis methods.
- The student would be able to apply knowledge to determine forces in determinate and indeterminate structures by the force and matrix method.
- The students would be able to perform ILD analysis of determinate beams and trusses.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B. Tech. II Semester

(5G644) BUILDING PLANNING & DRAWING

Course Objective:

- 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.

PART-A

Unit I

BUILDING BYELAWS AND REGULATIONS: Introduction – Terminology – Objectives of building byelaws – Floor area ratio (FAR) – Floor space Index (FSI) – Principles underlying building byelaws – classification of buildings – Open space requirements – built up area limitations – Height of Buildings – Wall thickness – lighting and ventilation requirement.

Unit II

RESIDENTIAL BUILDINGS: Minimum standards for various parts of buildings – requirements of different rooms and their grouping – characteristics of various types of residential buildings.

PUBLIC BUILDINGS AND CPM: Planning of Educational institutions, hospitals, dispensaries, Office buildings, banks, industrial buildings, hotels and motels, buildings for recreation.

Unit – III

PROJECT NETWORKING: Planning of construction projects – scheduling and monitoring Bar chart – CPM and PERT Network planning – computation of times and floats – their significance.

PART-B

Unit IV

SIGN CONVENTIONS AND BONDS: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminium alloys etc., Lead, Zinc, tin, white lead etc., Earth, Rock, Timber and Marble. English bond & Flemish bond odd & even courses for one, one and half, twobrick walls in thickness at the junction of a corner.

DOORS WINDOWS, VENTILATORS AND ROOFS: 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.

Unit V

Given line diagram with specification to draw, plan, section and elevation-sloped and flat roof buildings

Text Books:

1. Building Planning & Drawing by Dr N. Kumaraswamy and A.Kameswara Rao, Charitor Publications.
2. Planning and Designing and Scheduling- Gurucharan Singh and Jagadish Singh – Standard Publishers.
3. Planning and Designing of Buildings – Y.S.Sane

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

Course Outcomes

- Student would have a basic knowledge about the planning of the residential as well as public building.
- Student would have knowledge of preparation of the working drawing.
- Student will be able to prepare of submission drawing according to the local bylaws.
- The students would be able to identify the basic principals of building.
- The students would be able to know basic principal of free hand descriptive sketching to creative a realistic sketch of an object.
- The students will able to generate the two dimensional orthographic view of a building.
- The students will able to prepare working and submission drawing of a building.
- The students will able to construct a two point perspective of given two dimensional orthographic view of object.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B. Tech. I Semester

**(5GC35) APTITUDE AND REASONING SKILLS
(Common to CE, ME and CSE)**

Quantitative Aptitude:

Number Systems, Averages, Problems on ages, Allegations, Percentages, Profit and loss, Simple interest and Compound interest, Ratio and Proposition and variation, Time and Work, Time and Distance, Mensuration, Permutation and Combinations.

Progressions, Inequalities, Logarithms, HCF and LCM, Decimal Fractions, Simplification, Square Roots and Cube Roots, Pipes and Cisterns, Area, Volume and Surface Areas, Calendar, Clocks, True Discount, Banker's Discounts, Data Interpretation– Tabulation, Bar Graphs, Pie charts, Line Graphs

Reasoning:

Directions, Blood Relations, Problems on Cubes, Series and Sequences, Odd man out, Coding and Decoding, Data sufficiency, Logical deductions, Arrangements and Combinations, Groups and Teams, Puzzles to Puzzle you. More puzzles, Brain Teasers, Puzzles and Teasers

Text Books:

1. R.S. Agarwal, Quantitative Aptitude, S. Chand Publishers, New Delhi, 2005.
2. R.S. Agarwal, Verbal and Non-Verbal Reasoning, S.Chand Publishers, New Delhi, 1998.

Reference Books:

1. Arun Sharma, How to Prepare for Quantitative Aptitude, TMH Publishers, New Delhi, 2003.
2. Sharon Weiner-Green, IrnK.Wolf, Barron's GRE, Galgotia Publications, New Delhi, 2006.
3. Shakuntala Devi, Puzzles to Puzzle you, Orient Paper Backs Publishers(OPB), New Delhi, 2005.
4. Shakuntala Devi, More Puzzles, OPB, New Delhi, 2006.
5. Ravi Narula, Brain Teasers, Jaico Publishing House, New Delhi, 2005.
6. George J Summers, Puzzles and Teasers, Jaico Publishing House, Mumbai, 2005.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B. Tech. IISemester

(5G645) FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Course Objective:

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

List of experiments:

1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted rectangular notch and/or triangular notch.
5. Determination of coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli's equation.
7. Impact of jet on vanes.
8. Study of Hydraulic jump.
9. Performance test on Pelton wheel turbine.
10. Performance test on Francis turbine.
11. Efficiency test on Centrifugal pump.
12. Efficiency test on Reciprocating pump.

ANY OF THE EIGHT EXPERIMENTS ARE MANDATORY

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

II Year B. Tech. II Semester

(5G646) SURVEYING LAB – II

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:

1. Trigonometric Leveling - Heights and distance problem (Two Exercises)
2. Heights and distance using Principles of tacheometric surveying (Two Exercises)
3. Curve setting.
4. Setting out works for buildings & pipe lines.
5. Gradient of road using Theodolite.
6. Determination of area using total station.
7. Traversing using total station.
8. Contouring using total station.
9. Determination of remote height using total station.
10. Stake-out using total station.
11. Difference in height between two inaccessible points using total station.

ANY OF THE EIGHT EXPERIMENTS ARE MANDATORY

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. I Semester

(5GA51) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Common to CE, ECE and ME)

Course Objective:

- This paper aims to equip the budding engineering student with an understanding of concepts and tools of economic analysis. The focus does not only on understand the concepts but apply them in real life by developing problem solving skills there exists a relationship between Managerial Economics and Accounting and same is dealt in the second part of the course. The focus here is 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 journalisation, interpretation and use of Accounting Data.

Unit I

INTRODUCTION TO MANAGERIAL ECONOMICS: Definition, Nature and Scope of Managerial Economics – Relationship with other functional areas (Accounting, Marketing, HR, Production and Operations) of decision making - Basic Economic Principles - Opportunity Cost, Incremental Concept, scarcity, Marginalism, Equi-marginalism, Time perspective, Discounting principle, Risk and Uncertainty.

Unit II

DEMAND ANALYSIS: Meaning and types of demand – Determinants of demand - Law of Demand and its exceptions. Definition, types and measurement of elasticity of demand – Supply function and Elasticity of Supply - Demand Forecasting methods: Survey Methods - Consumers Survey Method, Sales force opinion method, experts opinion method - Statistical Methods: Trend Projection, Barometric, Regression, Simultaneous Equation method.

PRODUCTION AND COST ANALYSIS: Production Function, Cobb - Douglas Production function - Isoquants and Isocosts curves – MRTS - Least Cost Combination of Inputs - Laws of Returns, Internal and External Economies of Scale - 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).

Unit III

MARKET STRUCTURE AND PRICING METHODS: Competitive structure of markets – Perfect competition - Monopoly, Monopolistic and Oligopoly Markets - Price-output determination under perfect competition and monopoly in Long run and short run.

PRICING METHODS: Cost Plus Pricing - Marginal Cost Pricing - Sealed Bid Pricing - Going Rate Pricing - Limit Pricing - Market Skimming Pricing -

Penetration Pricing - Two-Part Pricing - Block Pricing - Bundling Pricing - Peak Load Pricing.

TYPES OF BUSINESS ORGANIZATIONS: Forms of Business Organizations – Need and role of public and private sector business organization - Types, Features, Merits and Demerits of public and private sector business organizations – Problems and remedies of public sector business organizations.

Unit IV

CAPITAL AND CAPITAL BUDGETING: Capital and its significance - Types of Capital - Sources of Raising Capital – Features of Capital budgeting - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), Net Present Value Method, Profitability index and Internal rate of return method (Simple problems).

FINANCIAL ACCOUNTING: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts - Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments.

Unit V

FINANCIAL ANALYSIS THROUGH RATIOS: Financial Ratios and its significance - Liquidity Ratios: Current Ratio, quick ratio and Absolute quick ratio - Turnover Ratios: Inventory turnover ratio, Debtors Turnover ratio, Working Capital Turnover ratio, Creditors Turnover ratio, Fixed Assets Turnover ratio - Solvency Ratios: Debt- Equity ratio, Interest Coverage ratio and Debt to total funds ratio - Profitability ratios: Gross Profit Ratio, Net Profit ratio and Proprietary ratio.

Text books:

1. Mehta P.L., *Managerial Economics-Analysis, Problems, Cases*, S Chand and Sons, New Delhi, 2001.
2. Dwivedi, *Managerial Economics*, Vikas , 6th Ed.
3. S.N.Maheswari & S.K. Maheswari, *Financial Accounting*, Vikas.
4. M.E.Thukaram Rao., *Accounting for Managers*, New Age International Publishers.

Reference books:

1. Varshney & Maheswari, *Managerial Economics*, Sultan Chand, 2003.
2. T.S. Reddy and Y.Hari Prasad Reddy, *Accounting and Financial Management*, Margham Publications.
3. Ambrish Gupta, *Financial Accounting for Management*, Pearson Education, New Delhi.
4. S. A. Siddiqui & A. S. Siddiqui, *Managerial Economics & Financial Analysis*, New age International Space Publications ess.
5. Narayanaswamy, *Financial Accounting—A Managerial Perspective*, PHITruet and Truet, *Managerial Economics:Analysis, Problems and Cases*, Wiley.

Course Outcomes:

- Provides a basic insight into seeking solutions for managerial problems.
- The student can familiarized with Accounting Data and Financial Statements.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. I Semester

(5G651) STRUCTURAL ANALYSIS - II

Course Objective:

- Indeterminate structures are subjected to different loading with different supported conditions; hence it is necessary to study the behaviour of the structures.

Unit I

THREE HINGED ARCHES: 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).

Unit II

SLOPE DEFLECTION METHOD: Analysis of single bay, single storey, portal frame including side sway.

S MOMENT DISTRIBUTION METHOD: Stiffness and carry over factors – Distribution factors – Analysis of single storey portal frames – including Sway .

Unit III

KANT'S METHOD: Analysis of continuous beams – including settlement of supports and single bay, single storey portal frames with side sway.

Unit IV

FLEXIBILITY METHODS: Introduction-application to continuous beams including support settlements.

STIFFNESS METHOD: Introduction-application to continuous beams including support settlements.

Unit V

PLASTIC ANALYSIS: 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.

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.
6. 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 Ramamuratham, jain book depot, New Delhi.
3. Structural analysis – Hibbler, 6th edition – Pearson publications.
Structural analysis by R.S.Khurmi, S.Chand Publications, New Delhi.
4. Analysis Of Structures By Dev Das Menon – John wiley publications

Course Outcomes

- Students will be able to understand the deflected shape of beams and frame and to learn their behavior.
- Students will be able to identify the stress pattern from photo elastic approach.
- Students will be able to understand the indeterminacy and learn to find the indeterminate reaction.
- Students should observe the buckling shape of Column under various end conditions

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. CE I Semester

(5G652) ENGINEERING GEOLOGY

Course Objective:

- 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 hazard"s 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 I

INTRODUCTION: 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.

Unit II

MINERALOGY: 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.

Unit III

PETROLOGY: 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.

Unit IV

GROUNDWATER, EARTHQUAKE AND LANDSLIDES: 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.

Unit V

GEOLOGY OF DAMS AND RESERVOIRS: 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., lithological, structural and groundwater) in tunneling, over break and lining in tunnels.

Text Books:

1. N.Chennakesavulu, Engineering Geology, 2nd Edition, Mc-Millan India Ltd., New Delhi, 2011.
2. D. Venkata Reddy, Engineering Geology, 1st Edition, 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:

- The students would have the knowledge of principles of engineering geology.
- The students would have the knowledge of properties of soil, various rocks and minerals
- The students would be able to judge the suitability of sites for various civil engineering structures.
- The students would exhibit the ability to use the knowledge of geological strata in the analysis and design the civil engineering structures.
- The students would have the knowledge for deciding the suitability of water and soil conservation projects.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. CE I Semester

(5G653) WATER RESOURCE ENGINEERING - I

Course Objectives:

To study the concepts of

- Engineering Hydrology and its applications like Runoff estimation, estimation of design discharge and flood routing.
- Irrigation Engineering – Water utilization for Crop growth, canals and their designs.

Unit I

INTRODUCTION: Introduction to engineering hydrology and its applications, Hydrologic cycle, types and forms of precipitation, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, processing of rainfall data.

Unit II

ABSTRACTION FROM RAINFALL: Abstraction from rainfall-evaporation, factors affecting evaporation, measurement of evaporation-evapotranspiration-Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices.

ABSTRACTION FROM RAINFALL: Runoff-components of runoff, factors affecting runoff, stream gauging, effective rainfall, separation of base flow.

Unit III

HYDROGRAPHY: Unit Hydrograph, definition, and limitations of applications of Unit hydrograph, derivation of Unit Hydrograph, S-hydrograph, IUH, Synthetic Unit Hydrograph. Design Discharge, Computation of design discharge-rational formula, SCS method.

Unit IV

GROUND WATER:- Ground water Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, radial flow to wells in confined and unconfined aquifers.

CANALS:-Classification of canals, design of Irrigation canals by Kennedy's and Lacey's theories, balancing depth of cutting, canal lining.

Unit V

IRRIGATION-I: - Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, Indian agricultural soils, methods of improving soil fertility, preparation of land for Irrigation, standards of quality for Irrigation water.

IRRIGATION-II:- Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, estimation of consumptive use, Duty and delta, factors affecting duty, depth and frequency of Irrigation, irrigation efficiencies.

Text Books:

1. Engineering Hydrology by Jayarami Reddy, Laxmi publications pvt. Ltd., New Delhi
2. Irrigation and water power engineering by Punmia& Lal, Laxmi publications pvt. Ltd., New Delhi
3. Engineering Hydrology by K.Subramanya, The Tata Mcgraw Hill Company, New Delhi

Reference Books:

1. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House.
2. Irrigation Water Management by D.K. Majundar, Printice Hall of India.
3. Engineering Hydrology by c.s.p.ojha ,Oxford Pubilishers, New Delhi
4. Applied Hydrology by Ven Te Chow, David R.maidment and Larry W.Mays, The Tata Mcgraw Hill Edition, New Delhi.

Course Outcomes:

- The students would demonstrate the capability to establish correlation between the various hydrological parameters.
- The students would have the knowledge of measurements of various parameters and its importance in water resource management.
- The students would be able to understand the hydrograph theory in the analysis of runoff and determination of design discharge for hydrological projects.
- The students would be able to apply various statistical methods in hydrological data analysis.
- The students would have the knowledge of importance of groundwater recharging and its techniques.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. I Semester

(5G654) ENVIROMENTAL ENGINEERING – I

Course Objective:

- This subject provides the knowledge of water sources, water treatment, design of distribution system waste water treatment, and safe disposal methods. The topics of characteristics of waste water, sludge digestion are also included.

Unit I

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.

UNIT II

WATER COLLECTION, CONVEYANCE AND DISTRIBUTION: 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.

Unit III

WATER TREATMENT – I: 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.

WATER TREATMENT – II: Theory of filtration – Different types of filters and their design - Disinfection – Disinfectants – Mechanism of disinfection – Different methods of disinfection – Break point chlorination – Types chlorination – Dose of disinfectant.

Unit IV

Sewage- Domestic and Storm water, Quantity of Sewage, Sewage flowvariations. Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers,; Sewerage, Sewer appurtenances, Design of sewerage systems. Storm Water- Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, National River cleaning plans, recycling of sewage – quality requirements for various purposes.

Unit V

SEWAGE- CHARACTERISTICS OF SEWAGE: composition, chemistry of sanitary sewage,B.O.D., C.O.D., aerobic and anaerobic decomposition. Sewage

Disposal: Sewage treatment: aims, methods of treatment and various flow-sheets for preliminary, primary, secondary and tertiary treatment, screens, grit chambers, primary and secondary clarifiers, disposal of screenings and grit. Biological treatment methods; principles, trickling filter operation, re-circulation, activated sludge process and its modifications, hydraulic design of trickling filter and activated sludge process, sludge volume index, , stabilization ponds. Sludge digestion: principles of anaerobic digestion, quantity and characterizations of sludge, design of sludge digestion tanks, disposal of digested sludge, drying beds. Low cost sanitation: septic tanks and Anaerobic Filter - principles, operation and suitability, design values, disposal of treated effluent. Tertiary Treatment methods – general description

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): Water Supply Engineering, 20th Revised Edition, Khanna Publishers, New Delhi, 2011.

Reference Books:

1. K.N. Duggal, Elements of Environmental Engineering, 1st Edition, S.Chand Publishers, New Delhi, 2010.
2. Nazih K. Shammam 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.
3. H.S. Peavy and D.R.Rowe, Environmental Engineering, 1st Edition, McGraw-Hill Publishing Company, New York, 1984.

Course Outcomes:

- The students would be able to briefly understand the sources of water demand supply.
- The student must be able to design the sewage treatment plant.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. I Semester

**(5G655) DESIGN & DRAWING OF REINFORCED CONCRETE
STRUCTURES**

Course Objective:

- Structural elements are subjected to different loading to with stand the structures, for external loading we need to design the structures for its safety and serviceability.

Unit I

INTRODUCTION: Introduction to Materials, Constituents of concrete, recommendation in IS 456 – 2000, grades of concrete, Design philosophy- working stress method, design constants; singly reinforced beam.

INTRODUCTION OF LIMIT STATE DESIGN: Concepts 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

Unit II

SHEAR, TORSION AND BOND: Limit state design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, including detailing

Unit III

BEAMS: Limit state design of singly reinforced, doubly reinforced and T beam sections.

SLABS: Design of one way slab - Two-way slab, continuous slab Using I S Coefficients.

Unit IV

COLUMNS: Short and long columns – under axial loads, uni-axial bending and biaxial bending – I S Code provisions.

FOOTINGS: Different types of footings – Design of isolated – square and rectangular footings.

Unit V

SERVICEABILITY: Limit state design of serviceability for deflection, cracking and codal provision.

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

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. Part A consists of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

Text Books:

1. Reinforced concrete design by S.Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.
2. Fundamentals of reinforced concrete by N.C. Sinha and S.K Roy, S. Chand publishers
3. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers, New Delhi
4. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad
5. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
6. Fundamentals of Reinforced concrete design by M.L. Gambhir, Printice Hall of India Private Ltd., New Delhi.
7. Design of concrete structures by J.N.Bandopadhyay –PHI Publications, New Delhi.
8. Relevant IS codes such as IS 456 – 2000 etc.

Reference Books:

1. Reinforced concrete structural elements – behaviour, Analysis and design by P.Purushotham, Tata Mc.Graw-Hill, 1994.
2. Limit state design of reinforced concrete – P.C.Varghese, Printice Hall of India, New Delhi
3. Reinforced concrete structures, Vol.1, by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt.Ltd., New Delhi
4. Reinforced concrete structures – I.C. Syal & A.K.Goel, S.Chand Publishers
5. Design of concrete structures – Arthur H.Nilson,David Darwin, and Charles W. Dolar, Tata Mc.Graw-Hill, 3rd Edition, 2005.

Codes/Tables: IS 456-2000 and IS-800 code books to be permitted into the examinations Hall.

Course Outcomes

- Students would be able to understand the basic concepts of reinforced concrete analysis and design.
- Students would be able to understand the behavior and various modes of failure of reinforced concrete members.
- Students would be able to analyze and design various reinforced concrete members.
- Students would be able to understand and analyze the effect of various support conditions on design of structures.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. I Semester

**(5GC53) ENGLISH FOR COMPETITIVE EXAMINATIONS
(Common to CE, CSE, ME and IT)**

ENGLISH FOR COMPETITIVE EXAMINATIONS

CORRECT ENGLISH USAGE: Articles – Prepositions – Tenses – Voice – Error spotting and correcting – Sentence improvement.

VOCABULARY: Synonyms – Antonyms – Analogy – Confusable Words.

ENGLISH PROFICIENCY: One-word substitutions – Idioms and Phrases – Homonyms – Spellings.

LOGIC-BASED ENGLISH LANGUAGE: Rearrangement of jumbled words and jumbled sentences – word pairs – sentence completion.

COMPREHENSION ABILITY: Reading comprehension – Cloze tests.

Reference Books:

1. R. S. Agarwal, *Objective English*. S. Chand Publishers.
2. Hari Prasad, *Objective English for Competitive Exams*. TMH.
3. Collins Cobuild, *English Guides: Confusable Words*.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. I Semester

(5G656) ENVIRONMENTAL ENGINEERING LAB

Course Objective:

- The laboratory provides knowledge of estimating various parameters like PH, Chlorides, Sulphates, Nitrates in water. For effective water treatment, the determination of optimum dosage of coagulant and chloride demand are also included. The estimation status of Industrial effluents will also be taught in the laboratory by estimating BOD and COD of effluent.

List of experiments:

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, settleable solids, dissolved solids and volatile Solids.
11. Determination of DO and theoretical aspects of BOD
12. Determination of Ammonia–nitrogen and Nitrates.
13. Estimation of Phosphates

ANY OF THE EIGHT EXPERIMENTS ARE MANDATORY

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. I Semester

(5G657) ENGINEERING GEOLOGY LAB

List of experiments:

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.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. I Semester

**ADVANCED ENGLISH COMMUNICATION SKILLS LAB
(AUDIT COURSE)**

RESUME PREPARATION

Structure, formats and styles – planning - defining career objective - projecting one's strengths and skills - creative self marketing—sample resumes - cover letter.

INTERVIEW SKILLS

Concept and process - pre-interview planning – preparation - body language - answering strategies – frequently asked questions

GROUP DISCUSSION

Communicating views and opinions – discussing – intervening – agreeing and disagreeing –asking for and giving clarification - substantiating - providing solution on any given topic across a cross-section of individuals - modulation of voice and clarity - body language – case study.

ORAL PRESENTATIONS (INDIVIDUAL)

Collection of data from various sources –planning, preparation and practice – attention gathering strategies -transition – handling questions from audience.

ORAL PRESENTATIONS (TEAM)

Appropriate use of visual aids – Using PowerPoint for presentation.

READING COMPREHENSION

Reading for facts – scanning – skimming - guessing meanings from context– speed reading.

LISTENING COMPREHENSION

Listening for understanding - responding relevantly.

MINIMUM REQUIREMENTS:

Advanced English Language Communication Skills Lab is conducted at two places:

- Computer-aided Language Lab with 60 computer machines, one teacher console, LAN facility and Language Learning software for self-study.
- Communication Skills Lab with movable chairs, a discussion room, Public Address System, a Television, a DVD Player, a camcorder, an LCD Projector and a computer machine.
- Manual cum Record, prepared by Faculty Members of English of the college will be used by students.

SUGGESTED SOFTWARE:

- It's your Job published by Clarity.
- Business Writing published by Clarity.
- Active Listening published by Clarity.
- Active Reading published by Clarity.
- Software published by Globberana.
- Cambridge Advanced Learner's Dictionary.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. II Semester

(5G661) WATER RESOURCE ENGINEERING – II

Course Objective:

- To study various head works canal structures and their design principles the subject also covers the river structures, their classifications, designs, etc.

Unit I

DAMS : Types of dams, merits and demerits, factors affecting selection of type of dam, factors governing selecting site for dam, types of reservoirs, selection of site for reservoir, reservoir yield, estimation of capacity of reservoir using mass curve.

GRAVITY DAMS: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a low gravity dam, stability analysis.

Unit II

EARTH DAMS: types of Earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam-graphical method, measures for control of seepage.

SPILLWAYS: types of spillways, design principles of Ogee spillways, types of spillway gates.

Unit III

DIVERSION HEAD WORKS: Types of Diversion head works-diversion and storage head works, weirs and barrages, layout of diversion head works, Components. Causes and failure of hydraulic structures on permeable foundations, Bligh's creep theory, Khosla's theory, determination of uplift pressure, impervious floors using Bligh's and Khosla's theory, exit gradient, functions of U/s and d/s sheet piles.

Unit IV

CANAL STRUCTURES I: types of falls and their location, design principles of Sarda type fall, trapezoidal notch fall and straight glacis fall.

CANAL STRUCTURES II: canal regulation works, principles of design of distributor and head regulators, canal outlets, types of canal modules, proportionality.

Unit V

CROSS DRAINAGE WORKS: types, selection of site, design principles of aqueduct, siphon aqueduct and super passage.

Text Books:

1. Irrigation engineering and hydraulic structures by S.K Garg, Khanna publishers.
2. Irrigation engineering by K.R.Arora
3. Irrigation Engineering by R.K. Sharma and T.K. Sharma, S. Chand Publishers
4. Irrigation and Water Power Engineering by Punmia and Lal, Laxmi Publications, New Delhi +

Reference Books:

1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers
2. Concrete dams by Varshney.
3. Theory and Design of Hydraulic structures by Varshney, Gupta & Gupta
4. Water resources engineering by Satyanarayana Murthy. Challa, New Age International Publishers.

Course Outcomes:

- The students would demonstrate the capability to establish correlation between the various hydrological parameters.
- The students would have the knowledge of measurements of various parameters and its importance in water resource management.
- The students would be able to understand the hydrograph theory in the analysis of runoff and determination of design discharge for hydrological projects.
- The students would be able to apply various statistical methods in hydrological data analysis.
- The students would have the knowledge of importance of groundwater recharging and its techniques.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY &
SCIENCES::RAJAMPET**

(AN AUTONOMOUS INSTITUTION)

III Year B. Tech. II Semester

(5G662) ADVANCED RCC DESIGN

Course Objective:

- To make the student more conversant with the design principles of multistoried buildings, roof system, foundation and other important structures.

UNITS:

1. Design of a flat slab (Interior panel only)
2. Design of concrete bunkers of circular shape – (excluding staging) – Introduction to silos
3. Design of concrete chimney
4. Design of Intz water tank excluding staging
5. Design of circular and rectangular water tank resting on the ground
6. Design of cantilever and counter forte retaining wall with horizontal back fill
7. Design of grid floor
8. (A) Design of slab less tread – riser stair case.
(B) Design of Longitudinal staircase

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
4. Advanced RCC by Varghese, PHI Publications, New Delhi.
5. Design of RCC structures by M.L.Gambhir P.H.I. Publications, New Delhi.

Reference Books:

1. R.C.C Designs by Sushil kumar , standard publishing house.
2. Fundamentals of RCC by N.C.Sinha and S.K.Roy, S.Chand Publications, New Delhi.

Course Outcomes:

- Students will be able to understand the deflected shape of beams and frame and to learn their behavior.
- Students will be able to identify the stress pattern from photo elastic approach.
- Students will be able to understand the indeterminacy and learn to find the indeterminate reaction.
- Students should observe the buckling shape of Column under various end conditions

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. II Semester

(5G663) GEOTECHNICAL ENGINEERING

Course Objective:

- The objective of this course is to make the student to understand the behaviour of soil under different loads and different conditions. This is necessary because the safety of any structure depends on soil on which it is going to be constructed.

Unit I

INTRODUCTION: Soil formation – soil structure and clay mineralogy– Adsorbed water – Mass- volume relationship – Relative density.

INDEX PROPERTIES OF SOILS: Moisture Content, Specific Gravity, Insitu density, Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils

Unit II

PERMEABILITY: Soil water – capillary rise – flow of water through soils – Darcy's law- permeability – Factors affecting – laboratory determination of coefficient of permeability –Permeability of layered systems.

Unit III

SEEPAGE THROUGH SOILS: Total, neutral and effective stresses – quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

STRESS DISTRIBUTION IN SOILS: Boussinesq's and Westergaard's theories for point loads and areas of different shapes – Newmark's influence chart.

Unit IV

COMPACTION: Mechanism of compaction – factors affecting – effects of compaction on soil properties. – Field compaction Equipment – compaction control.

CONSOLIDATION: stress history of clay; e-p and e-log p curves – magnitude and rate of 1-D consolidation – Terzaghi's Theory.

Unit V

SHEAR STRENGTH OF SOILS: Mohr – Coulomb Failure theories – Types of laboratory strength tests – strength tests based on drainage conditions – Shear strength of sands – Critical Void Ratio – Liquefaction- shear strength of clays.

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. Soil Mechanics and Foundation by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
4. 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. Geotechnical Engineering by Manoj Dutta & GulatiS.K – Tata Mc.Grawhill Publishers New Delhi.

Course Outcomes:

- The students should be able to plan the Geotechnical exploration program for major civil engineering structure.
- The students should be able to analyze the stability of slopes and solve the field problems.
- The students should predict the earth pressure over the earth resisting structures and their Geotechnical design

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. II Semester

(5G664) TRANSPORTATION ENGINEERING

Course Objective:

- It deal with different components of Transportation Engineering like highway, Railway & Airport Engineering. Emphasis is a Geometric Design of different elements in Transportation Engineering.

Unit I

HIGHWAY DEVELOPMENT AND PLANNING: Highway development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

HIGHWAY GEOMETRIC DESIGN: Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Over taking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.

Unit II

TRAFFIC ENGINEERING: Basic Parameters of Traffic-Volume, Speed and Density – Definitions and their inter relation - Traffic Volume Studies- Data Collection and Presentation-speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams.

TRAFFIC REGULATION AND MANAGEMENT: Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Specifications - Design of Traffic Signals.

Unit III

INTERSECTION DESIGN: Types of Intersections – Conflicts at 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.

Unit IV

PAVEMENT DESIGN: Types of pavements – Difference between flexible and rigid pavements – Pavement Components – Sub grade, Sub base, base and wearing course – Functions of pavement components – Design Factors –Flexible pavement. Design methods – G.I method, CBR Method, Tri-axial method – Numerical examples – Design of Rigid pavements – Critical load positions - Westergaard's stress equations– stresses in rigid pavements – Design of Expansion and contraction joints in CC pavements.

Unit V

INTRODUCTION TO AIR PORT ENGINEERING: Factors affecting airport site selection – Surveys for site selection – Aircraft characteristics and their influence on design elements – Planning of Terminal area – Typical Air port layouts.

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.

Text Books:

1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000).
2. Highway Engineering Design – L.R.Kadiyali and Lal- Khanna Publications.
3. Airport Planning and Design- S.K.Khanna and Arora,Nemchand Bros.
4. Airport Engineering by Rangwala, Charoter Publications, Anand.
5. A Text book of Transportation Engineering by S.P.Chandola, S.Chand Publications, New Delhi.

Reference Books:

1. Highway Engineering – S.P.Bindra , Dhanpat Rai & Sons. – 4th Edition (1981)
2. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna publications – 6th Edition – 1997.
3. Air Transportation Planning & design – Virendhra Kumar & Statish Chandhra – Gal Gotia Publishers (1999).
4. Introduction to Transportation Engineering by James.H.Banks, Tata Mc.Grawhill Edition, New Delhi
5. Traffic and Highway Engineering Nicholas.J.Garber & Lester A.Hoel
6. High way engineering by Paul .H.Wright & Karen K.Dixon,wiley india limited

Course Outcomes:

- Student should be conversant with various terminologies of Highway Engineering
- Students should have complete knowledge of Engineering Surveys, Planning Surveys and different objectives of Planning, so that he should be able to plan a new highway in a given region.
- Students should be able to design various geometric features of highways.
- Students should have general ideas about various design and construction practices in highway.
- Student should be conversant with various terminologies of Traffic Engineering.
- Students should be well aware of various safety features of highways.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. II Semester

**(5G665) ENVIRONMENTAL ENGINEERING – II
(PROFESSIONAL ELECTIVE – I)**

Course Objective:

- This subject provides the knowledge of water sources, water treatment, design of distribution system waste water treatment, and safe disposal methods. The topics of characteristics of waste water, sludge digestion are also included.

Unit I

Air Pollution – 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.

Unit II

Basic Theories of Industrial Waste water treatment – Volume reduction – Strength reduction – Neutralization – Equalization and proportioning– Nitrification and Denitrification – Removal of Phosphates–effluent standards.

Unit III

Solid waste Management – sources, composition and properties of solid waste –4 R's: reduce, reuse, recycle, recovery –collection and handling – separation and processing.Solid waste disposal methods – Land filling – Incineration – composting.

Unit IV

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 .advance treatment fluorides, arsenic, adsorbatio, ionj-exchange

Unit V

Noise Pollution – effects of noise and control methods – Environmental Audit – ISO – 14000 –Environmental Protection Act –Air Act – Water Act

Text Books:

1. Environmental Science and Engineering by J.G.Henry and G.W.Heinke – Person Education.
2. Environmental Engineering and Management – Dr.Suresh K.Dhameja – S.K.Kartarai & Sons 2nd Edition 2005.
3. Environmental Pollution Control Engineering by C.S Rao

Reference Books:

1. Physico – Chemical process for water quality control by Weber
2. Air Pollution and Control by MN Rao & H.N.Rao
- 3.Solid Waste Engineering by Paarne Vesilind, Willaiam, Cengage Publications, New Delhi.
4. Environmental Engineering by Peavy, Rowe and Tchobanoglous, Tata Mc Graw Hill publications

5. Central Pollution Control Board (<http://cpcb.nic.in/>) and Andhra Pradesh

Course Outcomes:

- The students would have a brief knowledge of solid waste processing, treatment and disposal including that of e-wastes.
- The students would have knowledge of characteristics of water, drinking water standards and necessity of treatment.
- The students would be able to understand the various unit operations and unit processes in water treatment and flow sheet of conventional municipal water treatment plant.
- The students would be able to understand the various characteristics of wastewater and its significance in sewerage project.
- The students would briefly know the methods of treatment and disposal of wastewater.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. II Semester

**(5G666) GROUND IMPROVEMENT TECHNIQUES
(PROFESSIONALELECTIVE –I)**

Course Objective:

- Delegates will gain an 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.

Unit I

DEWATERING: Methods of de-watering- sumps and interceptor ditches- single, multi stage well points - vacuum well points- Horizontal wells-foundation drains-blanket drains- criteria for selection of fill material around drains –Electro-osmosis.

GROUTING: Objectives of grouting- grouts and their properties-grouting methods-ascending, descending and stage grouting- hydraulic fracturing in soils and rocks-post grout test.

Unit II

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.

Unit III

STABILISATION: Methods of stabilization-mechanical-cement- lime bituminous-chemical stabilization with calcium chloride, sodium silicate and gypsum.

Unit IV

REINFORCED EARTH: Principles – Components of reinforced earth – factors governing design of reinforced earth walls – design principles of reinforced earth walls.

Unit V

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

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 Academic and 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 Jercey, USA

Course Outcomes:

- Students will get an idea of compaction, explosives, vibroflotation, vibroreplacement;
- Students will come across groundwater lowering, preloading, electro-osmosis
- Students will know about admixtures, grouting, freezingStudents will get knowledge of Geosynthetics, reinforcements

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. II Semester

**(5G667) GREEN BUILDINGS
(PROFESSIONAL ELECTIVE –I)**

Course Objective:

- Delegates will gain an understanding of various green materials used for construction.

Unit I

INTRODUCTION: What is Green Building, Why to go for Green Building, Benefits of Green Buildings, Green Building Materials and Equipment in India, What are key Requisites for Constructing a Green Building, Important Sustainable features for Green Building,

Unit II

GREEN BUILDING CONCEPTS AND PRACTICES INDIAN GREEN BUILDING COUNCIL: 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,

Unit III

GREEN BUILDING DESIGN INTRODUCTION: Reduction in Energy Demand, Onsite Sources and Sinks, Maximise 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,

Unit IV

AIR CONDITIONING INTRODUCTION: CII Godrej Green business centre, Design philosophy, Design interventions, Energy modeling, HVAC System design, Chiller selection, pump selection, Selection of cooling towers, Selection of air handling units, Precooling of fresh air, Interior lighting system, Key feature of the building. Eco-friendly captive power generation for factory, Building requirement.

UNIT V

MATERIAL CONSERVATION HANDLING OF NON PROCESS WASTE: 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, Indoor 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,

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. Recommended .

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:

- Students will get an idea of all the eco material.
- Able to apply the natural air conditioning.
- Conservation of all the construction material.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. II Semester

(5G668) ADVANCED STRUCTURAL ANALYSIS

(PROFESSIONAL ELECTIVE –I)

Course Objectives:

- Take advantage of a strong technical education at the undergraduate level to embark on successful professional careers in industry or to continue with a graduate education in their area of specialization.
- Consistently and successfully apply fundamental Structural Engineering principles within their chosen engineering application area (such as Aerospace, Civil, Marine, and Mechanical).
- Apply broad multi-disciplinary skills necessary to accomplish professional objectives in a rapidly changing technological world.
- Understand the ethical issues pertaining to engineering, adopt industry standards of ethical behavior, and apply appropriate communication and collaboration skills essential for professional practice.

Unit I

MOMENT DISTRIBUTION METHOD: Application to the analysis of portal frames with inclined legs, gable frames

STRAIN ENERGY METHOD: Application to the analysis of continuous beams and simple portal frames.

Unit II

INFLUENCE LINES: Influence line diagrams for Reaction, Shearing force and Bending moment in case of determinate beams and Influence line diagrams for member forces in determinate trusses – application of influence line diagrams.

Analysis of two hinged and three hinged arches using influence lines.

Unit III

FLEXIBILITY METHOD: Introduction to the structural analysis by flexibility concept using Matrix approach and application to continuous beams and plane trusses.

STIFFNESS METHOD: Introduction to the structural analysis by stiffness concept using Matrix approach and application to continuous beams and plane trusses.

Unit IV

ANALYSIS OF PORTAL FRAMES: flexibility and stiffness methods. Drawing of bending moment diagram.

Unit V

PLASTIC ANALYSIS: 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.

Text Books:

1. Matrix methods of Structural Analysis by Pandit and Gupta – TMH

2. Analysis of structures Vol. I & II by Vazrani and Ratwani. Khanna publications.
3. Comprehensive Structural Analysis Vol.1 & 2 by Dr. Vaidyanathan and Dr. P.Perumal - by Laxmi, publications Pvt. Ltd., New Delhi.

Reference Books:

1. Structural Analysis by D.S.Prakash Rao - Sagar books
3. Structural Analysis Vol. I & II by Bhavi Katti Vikas Publications.
4. Matrix structural analysis by T.N.Gayl; Tata Mc.Graw Hill Company

Course Outcomes:

- Ability to design and conduct experiments, as well as being able to analyze and interpret data.
- An ability to design a system, component, or process to meet desired needs.
- An ability to function in multi-disciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively with written, oral, and visual.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. II Semester

**(5G669) CONSTRUCTION PLANNING & PROJECT MANAGEMENT
(PROFESSIONAL ELECTIVE – II)**

Course Objectives:

- **Specific** Be clear about what will be achieved
- **Measurable** Quantify results and measure when they have been achieved
- **Achievable** Ensure they *can* be achieved
- **Realistic** Can be attained with within project resources
- **Timed** Can be attained within a specified timescale.

Unit I

BUILDING COMPONENTS: Lintels, arches, vaults, stair cases – Different types of floors - Concrete, mosaic, terrazzo floors – Pitched, flat and curved roofs – Lean-to-Roof, coupled roofs, trussed roofs -King and Queen post trusses - RCC Roofs - Madras Terrace/Shell Roofs.

Unit II

FINISHINGS: Damp Proofing , water proofing, Termite proofing, Fire proof-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.

Unit III

RESOURCE MANAGEMENT: Manpower: Resource smoothing – Resource leveling – Establishing workers productivity. Materials: Objectives of material management – Costs – Functions of material management departments – ABC classification of materials – Inventory of materials – Material procurement – Storesmanagement. Machinery : Classification of construction equipment – Earth moving equipment - Excavation equipment - Hauling equipment – Earth compaction equipment - Hoisting equipment - Concreting plant and equipment – Time and motion study – Selection of equipment – Task consideration – Cost consideration – Factors affecting the selection - Factors affecting cost owning and operating the equipment – Equipment maintenance.

Unit IV

PROJECT MANAGEMENT, BAR CHARTS AND MILESTONE CHARTS: Project planning – Scheduling – Controlling – Role of decision in project management – Techniques for analyzing alternatives -Operation research – Methods of planning and programming problems – Development of bar chart – Illustrative examples – Shortcomings of bar charts and remedial measures – Milestone charts – Development of PERT network problems.

ORGANIZATION: Types of organization – Merits and demerits of different types of organization – Authority – Policy – Recruitment process and training – Development of personnel department – Labour Problems – Labour legislation in India – Workmen’s Compensation Act of 1923 and Minimum Wages Act of 1948, and subsequent amendments– Safety in construction.

Unit V

ELEMENTS OF NETWORK AND DEVELOPMENT OF NETWORK:

Introduction – Event – Activity – Dummy – Graphical guidelines for network – Common partial situations in network – Numbering the events – Cycles Problems – Planning for network construction – Modes of network construction – Steps in development of network – Work breakdown structure – Hierarchies – Illustrative examples.

PERT AND CPM: Network analyses - PERT – Slack – Critical path – Illustrative examples – Probability of meeting scheduled date Problems – CPM Process – CPM Networks – Activity time estimate – Earliest event time – Latest allowable occurrence time – Combined tabular computations for T_E and T_L - Start and finish times of activity – Float – Critical activities and critical path – Illustrative examples.

Text Books:

1. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Building Construction, 10th Edition, Laxmi Publications (P) Ltd., New Delhi, 2010.
2. B.C.Punmia, K.K. Khandelwal, Project Planning and Control with PERT and CPM,4thEdition, Lakshmi Publications(P). Ltd., New Delhi, 2010.
3. Jha, Construction Project Management,1stEdition, Pearson Publications, New Delhi, 2011.

Reference Books

1. S. Seetharaman, Construction Engineering and Management, 3rd Edition, Umesh Publications, Delhi, 2010.
2. R. Chudly, Construction Technology – Vol. I and Vol. II, 4th Edition, Longman, UK, 1987.
3. P.K. Joy, Total Project Management: The Indian Context, 1st Edition, Mac Millan Publishers India Limited, 1993.

Course Outcomes:

- **Deliverables** - the tangible outputs like content, software, guidelines, etc
- **Knowledge and experience** - the less tangible outputs that should be documented and shared with Jisc and the wider community

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. II Semester

**(5G66A) FINITE ELEMENT METHOD FOR CIVIL ENGINEERING
(ELECTIVE II)**

Course objective:

- The subject should enable the students to learn the principles involved in discretization in finite element methods, forming of stiffness matrices and force vectors for simple elements, to know the various approaches followed in finite element analysis, usage of the various elements for discretization and to learn about shape functions. To learn the application of FEM in various structural problems incorporating temperature and boundary conditions and heat transfer problems.

Unit I

INTRODUCTION: 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.

Unit II

ONE DIMENSIONAL ELEMENTS: 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 coordinates

Unit III

GENERATION OF ELEMENT: Generation of element stiffness and nodal load matrices for 3-node triangular element and four noded rectangular elements.

Unit IV

ISOPARAMETRIC FORMULATION: Concepts of, isoparametric elements for 2D analysis –formulation of CST element, 4 –Noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.

Unit V

SOLUTION TECHNIQUES: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

Text Books:

1. Finite Elements Methods in Engineering by Tirupati. R. Chandrnpatla and Ashok D. Belegundu – Pearson Education Publications.
2. Finite element analysis by S.S. Bhavakatti-New age international publishers
3. Finite Element methods for Engineers by U.S.Dixit, Cengage Publishers, New Delhi.

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 Murthy- Tata Mc.Graw Hill Publishers

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:

- An ability to understand introductory basic principles and approaches for solving FEM problems in different fields.and an ability to formulate FEM model for simple problems like one dimensional bar element.
- An ability to understand and derive element matrices to find stresses in beams and trusses.
- An ability to understand basic concepts of plane stress and plane strain, stiffness matrix of CST element and axi-symmetric elements.
- An ability to write interpolation functions to higher order isoparametric elements and can solve the problems heat transfer problems using FEM and also to apply boundary conditions in realistic problems.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. II Semester

**(5G66B) EARTHQUAKE RESISTANT DESIGN
(PROFESSIONALELECTIVE – II)**

Course objective:

- The objective of this course is to teach the basic concepts of earthquake resistant design to a B.S. level Civil Engineer.

Unit I

Earthquake Engineering :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 Accelegrams.

Unit II

Codal Design Provisions : 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 for torsion.

Unit III

Codal Detailing Provisions: - Review of the latest Indian Seismic codes IS: 4326 and IS: 13920 provisions for ductile detailing of R.C buildings – Beam, column and joints.

Unit IV

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.

Unit V

Shear walls: Types – Design of Shear walls as per IS:13920 – Detailing of reinforcements.

Text Books:

1. Dynamics of Structures – Clough & Penzien, McGraw Hill – International Edition.
2. Earthquake Resistant Design of Structures – Pankaj Agarwal & Manish Shrikhande – Printice Hall of India, New Delhi

Reference Books:

1. Dynamics of Structures by A.K.Chopra – Pearson Education, Indian Branch, Delhi.
2. Earthquake Tips by C.V.R.Murty, I.I.T. Kanpur.
3. Structural Dynamics by Mario Paaz.

IS Codes: IS: 1893, IS:4326 and IS:13920.

Course outcomes:

- Suggest possible causes for the movements of the plates,
- Describe convergent, divergent, and transform types of plate boundaries,
- Describe elastic rebound theory as it is related to seismic activity,
- Distinguish between earthquake magnitude and earthquake damage (intensity),
- Understand why earthquakes occur, how they are measured and categorized and the effect they may have on engineering structures.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. II Semester

**(5G66C) ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT
FOR INFRASTRUCTURE PROJECTS
(PROFESSIONALELECTIVE –II)**

Course Objectives:

- confirm that the conditions of project approval are implemented satisfactorily;
- verify that impacts are within predicted or permitted limits;
- take action to manage unanticipated impacts or other unforeseen changes;
- ensure that environmental benefits are maximised through good practice; and learn from experience in order to improve EIA process and practice.

Unit I

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis.

Unit II

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

Unit III

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

Unit IV

Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report. Post Audit activities, The Environmental pollution Act, The water Act, The Air (Prevention & Control of pollution Act.), Mota Act, Wild life Act.

Unit V

Case studies and preparation of Environmental Impact assessment statement for various Industries.

Text books:

1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, KAKINADA.
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers

Reference Books:

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katania& Sons Publication., New Delhi.
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

Course Outcomes:

- appreciation of the contexts and role of EIA in environmental management;
- understanding of the elements of EIA and the processes by which they are applied;
- Acritical appreciation of the strengths and limitations of EIA;
- confidence to apply the framework of EIA to relevant situations.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. II Semester

(5G66D)TRANSPORTATION ENGINEERING LAB

List of Experiments:

I ROAD AGGREGATES:

1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity.
4. Water Absorption.
5. Attrition Test
6. Abrasion Test.
7. Shape tests

II BITUMINOUS MATERIALS:

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.

ANY OF THE EIGHT EXPERIMENTS ARE MANDATORY.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. II Semester

(4G66E) GEOTECHNICAL ENGINEERING LAB

Course Objective:

To obtain the properties of soils by conducting experiments, it is necessary for students to understand the behavior of soil under various loads and conditions.

LIST OF EXPERIMENTS

1. Atterberg's Limits.
2. Field density-core cutter and sand replacement method
3. Grain size analysis
4. Permeability of soil, constant and variable head test
5. Compaction test
6. CBR Test
7. Consolidation test
8. Unconfined compression test
9. Tri-axial Compression test
10. Direct shear test.
11. Vane shear test.

ANY OF THE EIGHT EXPERIMENTS ARE MANDATORY.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. I Semester

**STRESS MANAGEMENT
(AUDIT COURSE)**

Course Objective:

This course examines different sources from where individuals experience a stress response. Through diligent individual and group study, students will be able to learn to apply stress management principles in order to achieve high levels of performance and understand the role of relationships to the management of stress and health.

INSTRUCTIONAL OBJECTIVES

- Understand the physiological systems that are affected by stressors and the long-term effects and illnesses that can result from stressors.
- Understand the specific applications of stress as it relates to the work place and different target groups.
- Create effective stress management plans for individual clients and for workplace environments. Enhancing significance of training and development, performance evaluation

Unit I

UNDERSTANDING STRESS Meaning – Symptoms – Work Related Stress – Individual Stress – Reducing Stress -sources of stress –consequence of stress-burnout-symptoms of Burnout- stress verses Burnout-model of stress-strategies for coping stress (individual and organizational strategies) –case study

Unit II

TIME MANAGEMENT Techniques – Importance of Planning the day – developing concentration – Prioritizing Beginning at the start – Techniques for conquering procrastination – Sensible delegation – Taking the right breaks – Learning to say “No”

Unit III

CAREER PLATEAU Career plateau – Identifying Career plateaus – Structural and Content - Plateauing – Making a fresh start – Importance of Sabbaticals – Counseling out – Executive leasing – Sustaining a marketable Career.

Unit IV

CRISIS MANAGEMENT Implications – People issues – Structure issues – Environmental issues – Learning to keep calm - Preventing interruptions – Controlling crisis – Pushing new ideas – Empowerment – Work place Humour, developing a sense of Humour – Learning to laugh – role of group cohesion and team spirit.

Unit V

SELF DEVELOPMENT Improving personality – Leading with Integrity – Enhancing Creativity – Effective decision making – Sensible Communication – The Listening Game – Managing Self – Mediation for peace – Yoga for Life

Text Books

1. Bhatia R.L., The Executive Track: An Action Plan for Self-Development Wheeler Publishing, New Delhi
2. Charavathy.S.K, “Human Values for Manager”, McGraw Hill/HenelyManagement Series

Reference Books

1. Jeffr Davison, Managing Stress, Prentice Hall of India, New Delhi
2. Jerrold S Greenberg, Comprehensive Stress Management, Jain Books, 2009

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

III Year B. Tech. II Semester

**PROFESSIONAL ETHICS
(AUDIT COURSE)**

Course Objective :

To make the students understand ethics in engineering and infuse them with confidence to apply the same in their professional life.

INSTRUCTIONAL OBJECTIVES

- To understand the relevance of ethics and morals in engineering
- To appreciate the vulnerability to failure of engineering processes
- To comprehend the finer aspects of safety and risk with reference to the responsibilities of engineers.
- To understand the link between responsibility, rights and accountability
- To understand the global impact of engineering profession

Unit I

MORALS AND ETHICS IN ENGINEERING Senses of ‘Engineering Ethics’ – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg’s theory – Gilligan’s theory – Indian Theory-Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories

Unit II

ENGINEERING AS SOCIAL EXPERIMENTATION Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study – Titanic disaster as Case Study

Unit III

ENGINEER’S RESPONSIBILITY FOR SAFETY: Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator’s Approach to Risk – Disasters at Chernobyl and Bhopal - Case Studies

Unit IV

RESPONSIBILITIES, RIGHTS AND ACCOUNTABILITY Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

Unit V

GLOBAL ISSUES Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as

Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

Text Book

Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, New York, 2005.

Reference Books

1. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics oncepts and Cases”, Thompson Learning, 2000.
2. Charles D Fleddermann, “Engineering Ethics”, Prentice Hall, New Mexico, 1999.
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, 2003.
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, 2001.
5. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, “Business Ethics – An Indian Perspective”, Biztantra, New Delhi, 2004.
6. David Ermann and Michele S Shauf, “Computers, Ethics and Society”, Oxford University Press, 2003.
7. Jayashree Suresh, Raghavan, B.S., “Professional Ethics”, S. Chand & Company Ltd., 2005

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

(5G671) FOUNDATION ENGINEERING

Course Objective:

- To use the principles of Soil mechanics to design the foundations, Earth retaining structures and slope stability safely and economically knowledge of the subject is essential.

Unit I

SOIL EXPLORATION: Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Plate load test – Pressure meter – planning of Programme and preparation of soil investigation report.

Unit II

EARTH SLOPE STABILITY: Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method – Taylor's Stability Number- Stability of slopes of earth dams under different conditions.

EARTH PRESSURE THEORIES: Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory – Rebhann's and Culmann's graphical method

Unit III

RETAINING WALLS: Types of retaining walls – stability of retaining walls.

SHALLOW FOUNDATIONS: Types – choice of foundation – Location of depth – Safe Bearing Capacity – Terzaghi's, Meyerhoff's and Skempton's Methods.

Unit IV

ALLOWABLE BEARING PRESSURE: Safe bearing pressure based on N-value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – allowable settlements of structures – Settlement Analysis

Unit V

PILE FOUNDATION: 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.

Text Books:

1. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi
2. Geotechnical Engineering by C.Venkataramaiah,
3. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi.
4. Soil Mechanics and Foundations by – by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt.Ltd., 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).
4. Geotechnical Engineering by S. K.Gulhati & Manoj Datta – Tata Mc.Graw Hill Publishing company New Delhi. 2005.
5. Teng,W.C – Foundation Design , Prentice Hall, New Jersy
6. Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.

Course Outcomes:

- The students should be able to plan the Geotechnical exploration program for major civil engineering structure.
- The students should be able to analyze the stability of slopes and solve the field problems.
- The students should predict the earth pressure over the earth resisting structures and their Geotechnical design.
- The students should be able to understand various geotechnical designs and select type of shallow foundations.
- The students should be able to understand various geotechnical design their stability, and efficiency of deep foundations.
- The students should be able to evaluate the various techniques of ground improvement and apply them on field.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

(5G672) DESIGN & DRAWING OF STEEL STRUCTURES

Course Objective:

- To understand design specifications, loading and design procedures of different steel structures as per BIS specifications.

Unit I

WELDED & BOLTED CONNECTIONS: Introduction, Advantages and disadvantages of welding- Strength of welds-Butt and fillet welds: Permissible stresses – IS Code requirements. Design of welds fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints, beam to beam and beam to Column connections.

Unit II

BEAMS: Allowable stresses, design requirements as per IS Code-Design of simple and compound beams-Curtailment of flangeplates, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.

PLATE GIRDER: Design consideration – I S Code recommendations Design of plate girder-Welded – Curtailment of flange plates stiffeners – splicing's and connections.

Unit III

TENSION AND COMPRESSION MEMBERS: General Design of members subjected to direct tension and bending – effective length of columns. Slenderness ratio – permissible stresses. Design of compression members, struts etc.

Unit IV

DESIGN OF BUILT UP MEMBERS: - Design of Built up compression members – Design of lacings and battern.

DESIGN OF COLUMN FOUNDATIONS: Design of slab base and gusseted bases. Column bases subjected to moment.

Unit V

ROOF TRUSSES: Different types of trusses – Design loads – Load combinations IS Code recommendations, structural details – Design of purlins.

GANTRY GIRDER: Gantry girder impact factors – longitudinal forces, Design of Gantry girders.

Note: The students should prepare the following plates.

Plate 1 Detailing of simple beams

Plate 2 Detailing of Compound beams including curtailment of flange plates.

Plate 3 Detailing of Column including lacing and battens.

Plate 4 Detailing of Column bases – slab base and gusseted base

Plate 5 Detailing of steel roof trusses including particulars at joints.

Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. Part A consists of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

Text Books:

1. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad
2. Design of Steel Structures by Ramachandra. Vol – 1, Universities Press. Hyderabad
3. Steel Structures by Subramanyam.N, Oxford Higher Education, New Delhi
4. Limit State Design of steel structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi.
5. Design of Steel Structures by K.S.Sai Ram , Pearson Publishers.
6. Design of steel structures by Bhavikatti.

Reference Books:

1. Comprehensive Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
2. Structural design in steel by Sarwar Alam Raz, New Age International Publishers, New Delhi
3. Design of Steel Structures by P.Dayaratnam; S. Chand Publishers
4. Design of Steel Structures by M.Raghupathi, TataMc. Graw-Hill
5. Design of Steel Structures by Edwin Gaylord, Charles Gaylord, James Stallmeyer, Tata Mc.Graw-Hill, New Delhi.

Codes/Tables:

IS Codes:

- 1) IS -800 – 2007
- 2) IS – 875 – Part III
- 3) Steel Tables.
- 4) Railway Design Standards Code.

and steel tables to be permitted into the examination hall.

Course Outcomes:

- The students should be able to design various members As per IS Standards.
- The students should be able to design various welded connections.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

(5G673) BRIDGE ENGINEERING

Course Objective:

- It deal with different types of Bridges like deck slab bridge, T – Beam Bridge etc and gives a good knowledge on different components of bridges.

Unit I

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.

Unit II

DECK SLAB BRIDGE: Introduction – Effective width method of Analysis Design of deck Slab Bridge (Simply supported) subjected to class AA Tracked Vehicle only.

BEAM & SLAB BRIDGE (T-BEAM BRIDGE): General features – Design of interior panel of slab – Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only.

Unit III

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

Unit IV

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.

Unit V

PIERS & ABUTMENTS: 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).

Text Books:

1. Bridge Engineering by Ponnu Swamy, TATA Mcgraw Hill Company, New Delhi.
2. Design of Bridges by N.Krishnam Raju, 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:

- Students would be able to understand the basic concepts of reinforced concrete analysis and design.
- Students would be able to understand the behavior and various modes of failure of reinforced concrete members.
- Students would be able to analyze and design various reinforced concrete members.
- Students would be able to understand and analyze the effect of various support conditions on design of structures.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

(5G674) CONCRETE TECHNOLOGY

Course Objective:

- Lot of advances is taking place in the concrete technology as par with development taking place in the engineering. The present day industry needs the knowledge of concrete technology thoroughly. The subject is designed to give the basic knowledge as well as latest developments in concrete technology.

Unit I

CEMENTS & ADMIXTURES: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrated cement – Test`s on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures.

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UnitII

FRESH CONCRETE: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.

HARDENED CONCRETE : Water / Cement ratio – Abram’s Law – Gel space ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compressive & tensile strength - Curing.

UnitIII

TESTING OF HARDENED CONCRETE: Compression tests –Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Non-destructive testing methods – codal provisions for NDT.

ELASTICITY, CREEP & SHRINKAGE – Modulus of elasticity –nDynamic modulus of elasticity Poisson’s ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

Unit IV

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 method

UNIT V

SPECIAL CONCRETES: Light weight aggregates – Light weight 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 – SIFCON – Bacterial concrete(self healing concrete).

Text Books:

1. Properties of Concrete by A.M.Neville – Pearson publication – 4th edition
2. Concrete Technology by M.S.Shetty. – S.Chand & Co. ; 2004
3. Concrete Technology by A.M.Neville – Pearson publication

Reference Books:

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
2. Concrete Technology by A.R. Santha Kumar, Oxford university Press, New Delhi
3. Non-Destructive Test and Evaluation of materials by J.Prasad & C.G.K. Nair Tata Mcgrawhill Publishers, New Delhi

Course Outcomes:

- The students should be able to check and recommend different constituent of concrete.
- The students should be able to control method of manufacture of concrete.
- The students should be able to test strength and quality of plastic and set concrete.
- The students should have understanding of application admixture and its effect on properties of concrete.
- The students should be able to understand the effect of process of manufacturing on different properties of concrete.
- The students should be able to understand various environmental factors which affect durability of concrete, analyse cause of deterioration of concrete components and to suggest various preventive measures to it.
- The students should be able to design mix of concrete according to availability of ingredients and design needs.
- The students should be able to apply corrections to designed mix by degree of quality control and field corrections.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

**(5G675) PRESTRESSED CONCRETE
(PROFESSIONAL ELECTIVE –III)**

Course Objective:

- To understand the principle of prestressing and design of prestressed elements.

Unit I

INTRODUCTION: 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. ISCode provisions, Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.

Unit II

LOSSES OF PRESTRESS: 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.

Unit III

Analysis of sections for flexure; Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.

Unit IV

DESIGN OF SECTIONS FOR FLEXURE AND SHEAR: 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.

Unit V

ANALYSIS OF END BLOCKS: by Guyon's method and Mugnel method, Anchorage zone stresses – Approximate method of design – Anchorage zone reinforcement – Transfer of prestress pre-tensioned members.

Text Books:

1. Prestressed Concrete by Krishna Raju; - Tata Mc.Graw Hill Publications.
2. Prestressed Concrete by N.Rajasekharan; - Narosa publications.

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.

Codes: BIS code on prestressed concrete, IS 1343.

Course Outcomes:

- At the end of the course, the students will be able to understand the basic theories and the fundamental behaviour of prestressed concrete
- apply the fundamental knowledge to the solution of practical problems.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

(4G676) RAILWAYS, DOCKS & HARBOUR ENGINEERING

(PROFESSIONALELECTIVE –III)

Course Objectives:

- To know about the Planning using modern techniques such as GIS, GPS and remote sensing 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 conversant with the definition, purpose, location and materials of coastal structures such as piers, breakwaters, wharves, jetties, quays and spring fenders.
- To acquire knowledge on site investigation for location and planning of harbours

Unit I

INTRODUCTION TO RAILWAY ENGINEERING: Permanent way components – Cross Section of Permanent Way – Functions of various Components like Rails, Sleepers and Ballast –Rail Fastenings – Creep of Rails- Theories related to creep – **Adzing** of Sleepers- Sleeper density.

GEOMETRIC DESIGN OF RAILWAY TRACK: Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve – Crossings and Turn outs.

Unit II

STATIONS AND YARDS: Introduction-purpose of a railway station – selection of a site for a railway station – types of railway station ,PLAT FORMS – Definition of a yard – types of yards – level crossing— signaling systems and inter locking – staff quarters – goods traffic at way side stations.

TUNNELLING: Definition – types of tunneling – Drainage in tunnels – ventilation of tunnels – lining of tunnels – underground railways – tube railways – maintenance of rail way tunnels

Unit III

HISTORICAL DEVELOPMENT OF PORTS HARBOURS AND DOCKS: Introduction – Early Period of Travellers – Mediterranean Harbours – Cretan Harbours – Phasor Harbours- Phoenician Harbours – Greek harbors – Roman Harbours – Eighteenth Centruy Harbours – Slipways and Dry Docks – Dredging Machines – Historical Development of Bombay Port.

HARBOURS , DOCKS AND BREAK WATER: Introduction – Natural Harbours – Artificial Harbours – Size of Harbours – Open Berths – Docks Shape of Docks and Basins – Design and Construction of Basin or Dock Walls – Dock Entrances and Entrance Locks – Classification of Breakwaters – Upright Wall Breakwater – Mound With Super structure Water Breaker – Mound Breakwaters.

Unit IV

JETTIES, LANDING STAGES AND WHARVES : Jetties – Piled and Open Jetties – Piled and Cylinder Jetties – Scrded Cylinder Jetties – Scrded Cylinders in Jetties – Spring Fenders – Dolphins – Floating Landing Stages – Wharves – Masonry or Mass Concrete Walls – Wall on Wells – Wall of precast block.

Unit V

DREDGING AND MAINTENANCE : Introduction – Types of Dredgers – Bucket or Ladder Dredger – Sand Pump or Hydraulic Dredger or Cutter Dredger – Grab Dredger – Rock Dredger – Dipper Dredger – Hopper Barge –Maintenance of Buildings – Protection of Timber Piles – Maintenance of Lock Gates and Caissans – Maintenance Fresh Water, Hydraulic and Electric Mains – soundings – Organization of Maintenance.

Text Books:

1. Railway Engineering by Rangwala Chrotar Publisihing House, Anand.
2. Railway Engineering – A text book Transportation Engineering by S.P.Chandola, S. Chand and Co Ltd.
3. Docks and Harbour Engineering – Text book of Transport Engineering Vol.II by V.N. Vazirani and S.P. Chandola , Khanna Publishers, New Delhi.

Course Outcome:

- On completing the course, the students will• have the ability to Plan and Design various civil Engineering aspects of Railways, Airports and Harbour.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

**(4G677) ADVANCED ENVIRONMENTAL ENGINEERING
(PROFESSIONALELECTIVE –III)**

Course Objective:

- To know about various advanced water treatment techniques.

Unit I

ADVANCED WATER TREATMENT TECHNIQUES: Gas transfer: two film theory, aerator types and design of aerator units, solids separation, coagulation and flocculation theory, zeta potential and its significance, types of settling and related theory, design of settling tank, tube settlers, filtration theory, softening-chemical precipitation, ion exchange process, regeneration process, design aspects, demineralization, membrane process, reverse osmosis electro dialysis, ultra filtration, fluoridation & de fluoridation, taste and odor removal.

Unit II

STREAM SANITATION : Introduction; Self-purification in streams; factors affecting self-purification; Dissolved Oxygen Balance in streams; Streeter-Phelps's Dissolved Oxygen Model; Zones of Self-purification; Impact of pollutants on stream waters and usage of stream water with special reference to flora and fauna.

LOW COST WASTEWATER TREATMENT SYSTEMS INTRODUCTION; Stabilization ponds (including design aspects); Aerated lagoons; Oxidation ditch; Extended aeration process.

Unit III

ADVANCED INDUSTRIAL WASTE WATER TREATMENT: Introduction to Industrial Wastewater treatments. Sugar Plant: Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal. Dairy Industry: Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal. Pulp and Paper Industry: Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal.

Unit IV

ADVANCED CONCEPTS IN BIOLOGICAL WASTE TREATMENT: Introduction- Nitrogen removal by biological nitrification and de-nitrification; Phosphate removal from the activated sludge process; Rotating Disc Biological Contactor; Anaerobic filters; U-Tube aeration systems, tertiary treatment processes, adsorption, causes, types of adsorption, isotherms, factors affecting adsorption, ion exchange process, waste water disposal, reuse and recycle techniques.

UNIT V

ADVANCED TREATMENTS IN AIR POLLUTION CONTROL: Sources and Classification of Air Pollution, Natural contaminants; Particulate matter; Aerosols; Gaseous pollutants. **Meteorology And Air Pollution:** Atmospheric stability and temperature inversions; Maximum Mixing Depth; Wind direction and speed; Plume behaviour; Gaussian Dispersion Model; Plume rise; Wind rose. Air pollution

treatment ;**solid & hazardous waste management**, biomedical waste management and plastic waste management.

Text Books:

1. Physiochemical processes : W.J.Webber
2. Water supply & Treatment : Fair, Geyer & Okum
3. Wastewater Treatment by M.N. Rao and A.K. Datta; Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Wastewater Engineering, Treatment, Disposal and Reuse by Metcalf & Eddy Inc.; Tata Mc Graw –Hill Publishing Co. Ltd., New Delhi.
5. Air Pollution by M.N. Rao and H.V.N. Rao; Tata Mc Graw – Hill Publishing Co. Ltd., New Delhi.
6. Solid waste management by M.S Bhatt & Asheref Iliyan.

Reference Books

1. Manual of water supply and treatment : Govt. of India publication
2. Waste water treatment disposal & reuse : Metcalf & Eddy.
3. Environmental Pollution Control Engineering by C.S. Rao; Wiley Eastern Ltd., New Delhi.
4. Water Supply and Wastewater Disposal by G.M. Fair et all; John Wiley & Sons.
5. Sewage Disposal and Air Pollution Engineering by S.K. Garg; Khanna Publications, Delhi.
6. Sewage and Sewage Treatment by S.K. Kshirasagar; Roorkee Publishing House, Roorkee.

Solid Waste Management System – Collection Equipment - Guidelines (IS 12647)
Bureau of Indian Standards (BIS), Govt. of India

Course Outcome:

- On completing the course, the students will have the ability to apply various water treatment techniques based on quality of water.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

**(4G678) GROUND WATER DEVELOPMENT AND MANAGEMENT
(PROFESSIONALELECTIVE –III)**

Course Objective:

- To understand the distribution of ground water, evaluation of aquifer parameters, solving ground water equations. To study water methods, Ground water quality and development of ground water methods are dealt.

Unit I

Ground Water Occurrence: Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention.

Ground Water Movement: Permeability, Darcy's law, storage coefficient. Transmissivity, differential equation governing ground water flow in three dimensions derivation, ground water flow equation in polar coordinate system. Ground water flow contours their applications.

Unit II

Analysis of Pumping Test Data – I: Steady flow groundwater flow towards a well in confined and unconfined aquifers – Dupit's and Theism's equations, Assumptions, Formation constants, yield of an open well interface and well tests.

Analysis of Pumping Test Data – II: Unsteady flow towards well – Non equilibrium equations – Thesis solution – Jacob and Chow's simplifications, Leak aquifers.

Unit III

Surface and Subsurface Investigation: Surface methods of exploration – Electrical resistivity and Seismic refraction methods. Subsurface methods – Geophysical logging and resistivity logging. Aerial Photogrammetric applications along with case Studies in Subsurface Investigation.

Unit IV

Artificial Recharge of Ground Water: Concept of artificial recharge – recharge methods, relative merits, Applications of GIS and Remote Sensing in Artificial Recharge of Ground water along with Case studies.

Unit V

Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben-Herzberg relation, Shape of interface, control of seawater intrusion

Groundwater Basin Management: Concepts of conjunction use, Case studies.

Text Books:

1. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
2. Groundwater by H.M.Raghunath, Wiley Eastern Ltd.

Reference Books:

1. Groundwater by Bawvwr, John Wiley & sons.

2. Groundwater System Planning & Management – R.Willes & W.W.G.Yeh, Prentice Hall.
3. Applied Hydrogeology by C.W.Fetta, CBS Publishers & Distributors.

Course Outcomes:

- The students would demonstrate the capability to establish correlation between the various hydrological parameters.
- The students would have the knowledge of measurements of various parameters and its importance in water resource management.
- The students would be able to understand the hydrograph theory in the analysis of runoff and determination of design discharge for hydrological projects.
- The students would be able to apply various statistical methods in hydrological data analysis.
- The students would have the knowledge of importance of groundwater recharging and its techniques.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

**(5G679)DISASTER MANAGEMENT
(OPEN ELECTIVE)**

Course Objectives:

- To make the students convergent with various disasters and its impacts, risk reduction methods.

Unit I

INTRODUCTION - Concepts and definitions: disaster, hazard, vulnerability, risk, capacity, impact, prevention, mitigation).

Unit II

DISASTERS - Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills etc); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

Unit III

DISASTER IMPACTS - Disaster impacts (environmental, physical, social, ecological, economical, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate-change and urban disasters.

Unit IV

DISASTER RISK REDUCTION (DRR) - Disaster management cycle—its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post-disaster environmental response (water, sanitation, food safety, waste management, disease control); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

Unit V

Disasters, Environment and Development - Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land-use changes, urbanization etc.), sustainable and environmental-friendly recovery; reconstruction and development methods.

Text Books/Reference Books:

1. <http://ndma.gov.in/> (Home page of National Disaster Management Authority).
2. <http://www.ndmindia.nic.in/> (National Disaster management in India, Ministry of Home Affairs).
3. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
4. Singh B.K., 2008, Handbook of Disaster Management: techniques & Guidelines, Rajat Publication.
5. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation.

Course Outcomes

- The students will learn basic concepts of various disasters.
- The students must learn various classification of disasters hazard and vulnerability profile of India.
- The students will learn impacts, global and national disaster trends.
- The students will learn disaster management cycle and its phases and DRR programmes in India and activities of national disaster management academy.
- The students should be able to analyze factors affecting vulnerability of developmental projects and environmental modifications for sustainable development.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech., I Semester

**(5G27C)SYSTEM MODELLING & SIMULATION
(OPEN ELECTIVE)**

Course Objectives:

The course aims to provide the student with the ability

- To understand the basic system concepts and definitions of system.
- Techniques to model and to simulate various systems.
- To analyze a system and to make use of the information to improve the performance

Unit–I

Basic Simulation Modeling, Systems, Models and Simulation, Discrete Event Simulation, Simulation of Single Server Queuing System, Simulation of Inventory System, Alternative approach to Modeling and Simulation.

Unit–II

SIMULATION SOFTWARE: Comparison of Simulation Packages with Programming Languages, Classification of Software, Desirable Software Features, General Purpose Simulation Packages – Arena, Extend and Others, Object Oriented Simulation, Examples of Application Oriented Simulation Packages.

Unit–III

BUILDING SIMULATION MODELS: Guidelines for Determining Levels of Model Detail, Techniques for Increasing Model Validity and Credibility, **Modeling Time Driven Systems:** Modeling Input Signals, Delays, System Integration, Linear Systems, Motion Control Models, Numerical Experimentation.

Unit–IV

EXOGENOUS SIGNALS AND EVENTS: Disturbance Signals, State Machines, Petri Nets & Analysis, System Encapsulation,

MARKOV Process: Probabilistic Systems, Discrete Time Markov Processes, Random Walks, Poisson Processes, the Exponential Distribution, Simulating a Poisson Process, Continuous-Time Markov Processes.

Unit–V

EVENT DRIVEN MODELS AND SYSTEM OPTIMIZATION: Simulation Diagrams, Queuing Theory, Simulating Queuing Systems, Types of Queues, Multiple Servers, System Identification, Searches, Alpha/Beta Trackers, Multidimensional Optimization, Modeling and Simulation Mythology.

TEXT BOOKS:

1. System Modeling & Simulation, an Introduction – Frank L. Severance, John Wiley & Sons, 2001.
2. Simulation Modeling and Analysis – Averill M. Law, W. David Kelton, TMH, 3rd Edition, 2003.

Reference Book:

Systems Simulation – Geoffrey Gordon, PHI, 1978.

Course Outcomes:

- Define basic concepts in Modeling and Simulation.
- Understand the fundamental logic, structure, components and management of simulation modeling & demonstrate knowledge of how to use arena
- Classify various simulation models and give practical examples for each category
- Generate and test random number variates and apply them to develop simulation models
- Analyze output data produced by a model and test validity of the model
- Perform statistical analysis of output from terminating simulation

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

**(5G57D) TOTAL QUALITY MANAGEMENT
(OPEN ELECTIVE)**

Course Objectives:

The course aims to provide the student with the ability

- To demonstrate knowledge of quality management principles, techniques and philosophies.
- To apply statistical process control techniques to improve the quality.
- To demonstrate knowledge of TQM tools for industries.
- To apply appropriate techniques for reliability assessment.
- To demonstrate knowledge of advanced techniques for reliability engineering.

Unit-I

INTRODUCTION :Definition of Quality, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Strategic Planning, Deming Philosophy, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen

Unit-II

STATISTICAL PROCESS CONTROL (SPC) : The seven tools of quality, Statistical Fundamentals, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

Unit-III

TQM TOOLS AND QUALITY SYSTEMS : Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Quality Auditing

Unit-IV

INTRODUCTION TO RELIABILITY : Importance of reliability, performance cost and reliability, quality and safety, system configuration with examples, stochastic processes, bathtub concept, MTBF, MTTR, hazard rate, failure rate, probability and sampling, cumulative probability distribution function, data and distributions.

Unit-V

RELIABILITY IN DESIGN AND LIFE CYCLE COSTING : Survival rate, bath-tub curve analysis of characteristics of failure regimes, design synthesis, reliability effort function, safety margin, allocation of reliabilities by AGREE, ARINC, proportional distribution of unreliability, heuristic method, mean and median methods.

Text Books :

1. Joel E. Rose, *Total Quality Management*, 3rd Edition, Kogan Page Ltd., USA 1999
2. Srinath, L. S., *Reliability Engineering*, Affiliated East West Press, New Delhi 2005

Reference Books :

1. James R.Evans& William M.Lidsay, “The Management and Control of Quality”, (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5).
2. Feigenbaum.A.V. “Total Quality Management”, McGraw Hill, 1991.
3. Zeiri. “Total Quality Management for Engineers”, Wood Head Publishers, 1991.
4. E. E. Lewis, “Introduction to Reliability Engineering”, John Wiley and Sons.

Course Outcomes:

- Understand the concept of quality management principles, techniques and philosophies.
- Understand how to apply statistical process control techniques to improve the quality
- Can able to demonstrate knowledge of TQM tools for industries.
- Able to apply appropriate techniques for reliability assessment.
 - Understand the concept of advanced techniques for reliability engineering

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

**(5G57E) INTEGRATED PRODUCT DEVELOPMENT
(OPEN ELECTIVE)**

Course Objectives:

The course aims to provide the student with the ability

- To know the concepts of tools and techniques in the Integrated Product Development area of the Engineering Services industry.
- To Relate the engineering topics into real world engineering applications.

Unit-I

FUNDAMENTALS OF PRODUCT DEVELOPMENT Global Trends Analysis and Product decision: Types of various trends affecting product decision - Social Trends-Technical Trends- Economical Trends- Environmental Trends- Political/Policy Trends- PESTLE Analysis. Introduction to Product Development Methodologies and Management: Overview of Products and Services- Types of Product Development- Overview of Product Development methodologies - Product Life Cycle - Product Development Planning and Management .

Unit-II

REQUIREMENTS AND SYSTEM DESIGN Requirement Engineering: Types of Requirements- Requirement Engineering- Analysis -Traceability Matrix and Analysis- Requirement Management. System Design & Modeling: Introduction to System Modeling- introduction to System Optimization- System Specification-Sub-System Design- Interface Design.

Unit-III

DESIGN AND TESTING Conceptualization -Industrial Design and User Interface Design- Introduction to Concept generation Techniques-Concept Screening & Evaluation- Concept Design- S/W Architecture- Hardware Schematics and simulation-Detailed Design: Component Design and Verification- High Level Design/Low Level Design of S/W Programs- S/W Testing-Hardware Schematic-Component design- Layout and Hardware Testing.

Unit-IV

IMPLEMENTATION & INTEGRATION Prototyping: Types of Prototypes - Introduction to Rapid Prototyping and Rapid Manufacturing. System Integration-Testing- Certification and Documentation: Introduction to Manufacturing /Purchase and Assembly of Systems- Integration of Mechanical, Embedded and S/W systems- Introduction to Product verification and validation processes - Product Testing standards, Certification and Documentation.

Unit-V

SUSTENANCE ENGINEERING AND BUSINESS DYNAMICS Sustenance - Maintenance and Repair- Enhancements Product End of Life (EoL): Obsolescence Management-Configuration Management- EoL Disposal.

The Industry - Engineering Services Industry overview- Product development in Industry versus Academia The IPD Essentials- Introduction to vertical specific

product development processes- Product development Trade-offs- Intellectual Property Rights and Confidentiality- Security and configuration management

Text Books :

1. NASSCOM student Handbook "Foundation Skills in Integrated Product Development".
2. Anita Goyal, Karl T Ulrich, Steven D Eppinger, "Product Design and Development", 4th Edition, 2009, Tata McGraw-Hill Education, ISBN-10-007-14679-9

Reference Books:

1. George E.Dieter, Linda C.Schmidt, "Engineering Design", McGraw-Hill International Edition, 4th Edition, 2009, ISBN 978-007-127189-9
2. Kevin Otto, Kristin Wood, "Product Design", Indian Reprint 2004, Pearson Education,ISBN. 9788177588217
3. Yousef Haik, T. M. M. Shahin, "Engineering Design Process", 2nd Edition Reprint, Cengage Learning, 2010, ISBN 0495668141
4. Clive L.Dym, Patrick Little, "Engineering Design: A Project-based Introduction", 3rd Edition, John Wiley & Sons, 2009, ISBN 978-0-470-22596-7
5. Product Design Techniques in Reverse Engineering and New Product Development, KEVIN OTTO & KRISTIN WOOD, Pearson Education (LPE), 2001.
6. The Management and control of Quality-6th edition-James R. Evens, William M Lindsay Pub: son south-western(www.swlearning.com)

Course Outcomes:

- Students able to summarise the various trends affecting product decision.
- Students able to identify the requirements to create new product.
- Students able to compare different techniques involved in design creation and design testing.
- Students able to rephrase the methods of model creation and integration between software and hardware.
- Students able to illustrate the need of end of life and patenting.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

**(5G377)NANOTECHNOLOGY AND APPLICATIONS
(OPEN ELECTIVE)**

Course Objectives:

The course aims to provide the student with the ability

- To learn the fundamentals of Nano materials and technology.
- To understand the applications and limitation of Nano Technology.

Unit-I

INTRODUCTION: Introduction to nanotechnology and materials, Nano materials, Introduction to nano-sizes and properties comparison with the bulk materials, Different shapes and sizes and morphology.

FABRICATION OF NANO MATERIALS: Top Down Approach Grinding, Planetary milling and Comparison of particles, Bottom Up Approach, Wet Chemical Synthesis Methods, Micro emulsion Approach, Colloidal Nano particles Production, Sol Gel Methods, Sono chemical Approach, Microwave and Atomization, Gas phase Production Methods : Chemical Vapour Depositions.

Unit-II

KINETICS AT NANOSCALE: Nucleation and growth of particles, Issues of Aggregation of Particles, Oswald Ripening, Stearic hindrance, Layers of surface charges, Zeta Potential and pH.

Carbon Nano materials: Synthesis of carbon bucky-balls, List of stable carbon allotropes extended, fullerenes, metallo fullerenes, solid C60, bucky onions, nano tubes, nano cones.

Unit-III

QUANTUM MECHANICS: Quantum dots and its Importance, Pauli exclusion principle, Schrödinger's equation, Application of quantum Dots: quantum well, wire, dot, characteristics of quantum dots, Synthesis of quantum dots Semi-conductor quantum dots

Unit-IV

NANOMATERIALS CHARACTERIZATION: Fractionation principles of Particle size measurements, Particle size and its distribution, XRD, Zeta potential, Electronic band structure Electron statistics Application:

Unit-V

NANOBIولوجY: Biological synthesis of nano particles and applications in drug delivery, Nano containers and Responsive Release of active agents, Layer by Layer assembly for nano spheres, Safety and health Issues of nano materials, Environmental Impacts, Case Study for Environmental and Societal Impacts.

Text Books:

1. Kulkarni Sulabha K, Nanotechnology: Principles and Practices, Capital Publishing Company, 2007
2. Stuart M. Lindsay, Introduction to Nanoscience, Oxford University Press, 2009.
3. Robert Kelsall, Ian Hamley, Mark Geoghegan, Nanoscale Science and Technology, John Wiley & Sons, 2005.
4. Gabor L. Hornyak , H.F. Tibbals , Joydeep Dutta , John J. Moore Introduction to Nanoscience and Nanotechnology CRC Press
5. Davies, J.H. ‘The Physics of Low Dimensional Semiconductors: An Introduction’, Cambridge University Press, 1998

Course Outcomes:

Upon completion of the course, students can

- Learn the basics of Nano Materials and Nano Scale
- Knows the fundamentals of Quantum Mechanics.
- Understands the basics of different Nano Materials.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

**(5G378) MEDICAL INSTRUMENTATION
(OPEN ELECTIVE – I)**

Course Objectives:

The course aims to provide the student with the ability

- To learn the fundamentals of Electro neurogram and Blood Pressure.
- To understand the applications of Blood flow measurement and Pulse Oximeter.

Unit-I

GENERAL INTRODUCTION: The cell, body fluids, Musculoskeletal system, respiratory system, gastrointestinal system, Nervous system, endocrine system and circulatory system. Origin of Bio potentials: electrical activity of Excitable cells: the resting state, The active state, Volume conductor fields, Functional organization of the peripheral nervous system: Reflex arc & Junctional transmission.

Unit-II

THE ELECTRONEUROGRAM (ENG): The H-Reflex, The Electromyogram (EMG), The Electrocardiogram (ECG), heart and the circulatory system, Electro conduction system of the heart and heart problems, ECG waveform and Physical significance of its wave features, Electrical behavior of cardiac cells, The standard lead system, The ECG preamplifier, DC ECG Amplifier, Defibrillator protection circuit, Electro surgery Unit filtering, Functional blocks of ECG system, Multichannel physiological monitoring system, Common problems encountered and remedial techniques.

Unit-III

BLOOD PRESSURE: indirect measurement of blood pressure, korotkoff sounds, auscultatory method using sphygmo manometer, Oscillometric and ultrasonic non invasive pressure measurement, Direct measurement of blood pressure H₂O manometers, electronic manometry, Pressure transducers,. Pressure amplifier designs, Systolic, diastolic mean detector circuits

Unit-IV

BLOOD FLOW AND VOLUME MEASUREMENT: indicator dilution methods, Transit time flow meter, DC flow meter, Electromagnetic flow meter AC electromagnetic flow meter, Quadrature suppression flow meter, Ultrasonic flow meter, Continuous-wave Doppler flow meter, Electric impedance plethysmography, chamber plethysmography, Photo plethysmography.

Unit-V

PULSE OXIMETER: Principles of Operation, Absorption Spectrum, Sensor design, Pulse oximeter, Therapeutic and Prosthetic Devices. Cardiac Pacemakers: Lead wires and electrodes, Synchronous Pacemakers, rate responsive pacemaking, Defibrillators, cardioverters, Electrosurgical-unit, Therapeutic applications of laser, Lithotripsy Haemodialysis.

TEXT BOOKS:

1. John G Webster, Medical Instrumentation: Application and Design , John Wiley,3rd Ed. 2012.
2. Joseph J. Carr & John M. Brown , Introduction to biomedical Equipment Technology, 4th Ed., Prentice Hall India, 2001

Course Outcomes:

Upon completion of the course, students can

- Learn the basics of Human being Bio potentials.
- Know the fundamentals of Blood flow and volume measurement.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

**(5G178) .NET TECHNOLOGIES
(OPEN ELECTIVE)**

Course Objectives:

The Objective of the course is the student should be able to do the following things:

- Develop programs using C# programming language.
- Learn Assemblies, App Domains, COM, Code Access Security, Code Optimization, Cryptography and data protection.
- Develop data driven applications using ADO.NET, data providers.
- Data base programming using sql server 2005 programming.
- Learn ASP.NET fundamentals, state management, master pages, web parts, security, Web Services.
- Learn Advanced Web Services Programming.
- Develop Windows Applications using Windows Forms, Control Library, Advanced UI Programming, Data Binding concepts.
- Learn Smart Clients, Click Once technology, Enterprise Services, Remoting.

Unit-I

INTRODUCTION TO .NET FRAMEWORK: .NET Overview- Behind Microsoft .NET- The .NET Platform-.NET Framework Design Goals- .NET Framework- Common Language Runtime –CLR Environments and Executables-Metadata-JIT Compilation-Automatic Memory Management-Assemblies and Manifests- Intermediate Language(IL)- CTS and CLS- CLR Execution.

Unit-II

INTRODUCTION TO C# .NET PROGRAMMING: A Demonstration of Visual C#- Common Elements in Visual C- C# Core Language Features- Types- Classes- Structures- Enumeration- Inheritance- Interfaces- Polymorphism- Arrays and Collections- Generics- Operator Overloading- Delegates and Events- Introduction to LINQ Programming- Exception Handling- MSIL Programming.

Unit-III

APPLICATION DEVELOPMENT USING ADO .NET: Features of ADO .NET- Architecture of ADO .NET- ADO .NET Providers- Accessing Database using ADO .NET- Connection Opening and Closing- Command Object- Data Adapter- Dataset- Data Tables- Controlling table views with Data Views and Data Relation Objects- Data-binding in Windows Forms and Web Forms.

Unit-IV

INTRODUCTION TO ASP.NET: Introduction- Working in ASP.NET Controls- Session and Cookies- Caching- Authentication and Authorization-Web User Controls- Working with Web Config file- Implementing Security- Crystal Reports- Creating Setup and Deployment.

Unit-V

WEB SERVICES: Introduction to Web Services- Web Services Protocol and Standards- WSDL-Overview of UDDI- Calling a Web Service from a Browser- Calling a Web Service by using a proxy- Creating a Simple Web Service-AJAX

Text Books:

1. Thuan L. Thai. .NET Framework Essentials. O'Reilly, 2003, 3rd Ed.
2. Donis Marshall. Programming Microsoft Visual C# 2008. Microsoft Press 2008.
3. Francesco Balena. Programming Microsoft Visual Basic .NET. Microsoft Press 2006.

Reference Books:

1. Rebecca M. Riordan. Microsoft ADO.NET Step by Step. Microsoft Press 2002.
2. Kogent, ASP.NET 3.5 Black Book, Dream Tech Publications, 2010.
3. Andy Wigley, Peter Roxburgh. Building Microsoft ASP.NET Applications for Mobile Devices. Microsoft Press 2003, 2nd Ed.

Course Outcomes:

After the completion of the course the student will be able to:

- Develop programs using C# programming language.
- Create fully functional data driven applications using ADO.Net
- Build secure web applications using ASP.Net.
- Create dynamic Web applications that interact with a database using server-side programming.
- Create Web Services.
- Develop Windows Forms Applications and data driven applications using various controls.
- Develop Enterprise Services and Remote Applications.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

**(5G473) CYBER LAWS
(OPEN ELECTIVE)**

Course Objectives:

- To explain the basic information on cyber security.
- To understand the issues those are specific to amendment rights.
- To have knowledge on copy right issues of software's.
- To understand ethical laws of computer for different countries.

Unit-I

FUNDAMENTALS OF CYBER SECURITY Introduction-Cyber Security and its Problem-Intervention Strategies: Redundancy, Diversity and Autarchy.

Unit-II

ISSUES IN CYBER SECURITY Private ordering solutions, Regulation and Jurisdiction for global Cyber security, Copy Right-source of risks, Pirates, Internet Infringement, Fair Use, postings, criminal liability, First Amendments, Data Loss.

Unit-III

INTELLECTUAL PROPERTY RIGHTS Copy Right-Source of risks, Pirates, Internet Infringement, Fair Use, postings, Criminal Liability, First Amendments, Losing Data, Trademarks, Defamation, Privacy-Common Law Privacy, Constitutional law, Federal Statutes, Anonymity, Technology expanding privacy rights.

Unit-IV

PROCEDURAL ISSUES Duty of Care, Criminal Liability, Procedural issues, Electronic Contracts & Digital Signatures, Misappropriation of information, Civil Rights, Tax, Evidence.

Unit-V

LEGAL ASPECTS OF CYBER SECURITY Ethics, Legal Developments, Late 1990 to 2000, Cyber security in Society, Security in cyber laws case. studies, General law and Cyber Law-a Swift Analysis.

Reference Books:

1. Jonathan Rosenoer, "Cyber Law: The law of the Internet", Springer-Verlag, 1997.
2. Mark F Grady, Fransesco Parisi, "The Law and Economics of Cyber Security", Cambridge University Press, 2006.

Course Outcomes:

At the end of the course, students should be able to:

- Critically evaluate ongoing developments in law relating to information technologies
- Display an understanding of how these developments relate to one another.
- Examine areas of doctrinal and political debate surrounding rules and theories;
- Evaluate those rules and theories in terms of internal coherence and practical outcomes;
- Draw on the analysis and evaluation contained in primary and secondary sources.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

**(5GA71) INTELLECTUAL PROPERTY RIGHTS
(OPEN ELECTIVE)**

Course Objectives:

- This course is aimed at familiarizing students with the nuances of Intellectual Property Rights (IPR) so as to help them integrate the IPR process in their academic, research (project) activities and to facilitate the students to explore career options in IPR.
- To make the technological students familiar with basics of IPR and their implications in research, development and commercialization.

Unit-I

CONCEPT OF PROPERTY: Meaning of Property, Kinds of property: Movable and Immovable property; Tangible and Intangible property; Intellectual property; Private and Public property. Possession and ownership.

Unit-II

INTELLECTUAL PROPERTY RIGHTS: 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.

Unit-III

COPYRIGHTS & TRADEMARKS: Copyright: 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 proofing passing off action.

Unit-IV

PATENTS, DESIGNS & GEOGRAPHICAL INDICATORS: 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.

Unit-V

INTERNATIONAL INSTRUMENTS CONCERNING INTELLECTUAL PROPERTY RIGHTS: The Berne Convention, Universal Copyright Convention, The Paris Union, The World Intellectual Property Rights Organization (WIPO), UNESCO, TRIPS, TRIMS, and WTO.

Reference Books:

- Intellectual Property Rights: Basic Concepts, MMS Karki, Atlantic, 2009.
- Intellectual Property Rights, Pandey, Neeraj, Dharani, Khushdeep.
- Intellectual Property Rights in India: General Issues and Implications, Dr. Prankrishna Pal, Regal Series.

- IntellectualProperty, W.R.Cornish, Sweet & Maxwell, London, 2012.
- Principles of IntellectualProperty, N.S.Gopalakrishnan & T.G.Agitha, Eastern Book Company, Lucknow, 2009.

Course Outcome :

- The students will be able to understand the issues related to intellectual properties. The knowledge gained by the students on copyrights, trademarks, patents, designs, etc. shall be useful to focus on new inventions and their commercialization.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

**(5GA72)HUMANRESOURCEMANAGEMENT
(OPEN ELECTIVE)**

Course Objective

The course is designed broadly to promote understanding of procurement, development, maintenance, evaluation and overall effective utilization of manpower.

Unit-I

INTRODUCTION TO HUMAN RESOURCE MANAGEMENT: Definition, Introduction, Nature of HRM, Scope of HRM, Functions of HRM-Managerial Functions, Operative Functions, Role of HRM. Personnel Management and HRM, Competitive Challenges influencing HRM, Ethical Aspects of HRM.

Unit-II

HUMANRESOURCE PLANNING: Introduction to Human Resource Planning (HRP), Nature of HRP, Need and Importance of HRP in Organizations, Factors Affecting HRP, HRP Process, Barriers to Human HRP. Human Resource Information System. **Job Analysis and Job Design**–Definition, Steps in Job Analysis, Methods for Collecting Job Analysis Data, Job Description ,Job Specification, Job Design-Methods of Job Design.

Unit-III

PROCUREMENT OF MANPOWER: Recruitment-Meaning and Definition, Process of Recruitment, Factor Affecting Recruitment, Sources of Recruitment, Methods of Recruitment. **Selection**– Introduction, SelectionProcedure, Selection Decision Outcomes, Placement and Orientation.

Unit-IV

DEVELOPMENT OF MAN POWER: Employee Training–Concept, Need for Employee Training, Process of Employee Training, Methods of Employee Training, Advantages and disadvantages. **Executive Development**–Objectives, Importance, Factors Influencing Executive Development, Process, Methods of Executive Development, Career Planning and Development.

Unit-V

COMPENSATING, MAINTAINING AND EVALUATING THE MAN POWER: Compensation-Objectives, components of pay structure in India, Wage Policy in India - Minimum Wage, Fair Wage and Living Wage. **Discipline and Grievance Procedures**- Disciplinary Procedure, Grievance Handling Procedure, importance and approaches of Industrial Relations. Collective Bargaining Process. **Performance Appraisal** - Definition, Purpose of appraisal, Procedures and Techniquesincluding360degree Performance Appraisal,Job Evaluation.

Reference Books:

1. NoeA.RaymondJohnHollenbeck,Barry GerhartandPatrickWright- HumanResource Management,(TataMcGrawHill.).
2. IanBeardwell&LenHoldenHuman ResourceManagement,(MacmillanIndiaLtd.).
3. Aswathappa K-Human Resource and Personnel Management TataMcGrawHill,5thEd.).

4. Rao VSP – Human Resource Management, Text and Cases (Excel Books, 2nd Ed.).
5. Ivansevich – Human Resource Management (Tata McGraw Hill, 10th Ed.).
6. Dessler – Human Resource Management (Prentice Hall, 10th Ed.).
7. Bernardi – Human Resource Management (Tata McGraw Hill, 4th Ed.).
8. Human Resource Management, T.N Chhabra, Dhanpat Rai & Sons Pvt Ltd.

Course Outcome

- After completion of the course the student will be able to understand all functions of human resource management.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

(5G67C) CAD and STAAD LAB

SOFTWARE:

1. STAAD PRO or Equivalent

EXCERCISES:

1. Building Drawings: One Exercise
2. R.C.C Drawings: One Exercise
3. Bridge Drawings : One Exercise
4. Steel Drawings : One Exercise
5. 2-D Frame Analysis and Design
6. Steel Tabular Truss Analysis and Design
7. 3-D Frame Analysis and Design
8. Retaining Wall Analysis and Design
9. Simple tower Analysis and Design
10. One Way Slab Analysis & Design
11. Two Way Slab Analysis & Design
12. Column Analysis & Design

Text Books:

1. Building planning & Drawings by DR.N. Kumara Swamy
2. R.C.C Drawings by Krishna murthy
3. Computer Aided Design Lab Manual by Dr.M.N.Sesha Prakash And Dr.C.S.Suresh.

ANY OF THE EIGHT EXPERIMENTS ARE MANDATORY

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. I Semester

(4G67E) CONCRETE TECHNOLOGY LAB

List of Experiments:

1. Normal Consistency
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. Workability test on concrete by compaction factor, slump and Vee-bee.
8. Young's modulus and compressive strength of concrete.
9. Bulking of sand.
10. Non-Destructive testing on concrete (for demonstration).
11. Flexural strength of concrete.
12. Water permeability test on concrete.
13. Specific gravity of aggregates.

ANY OF THE EIGHT EXPERIMENTS ARE MANDATORY

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. II Semester

(5G681) DESIGN AND DRAWING OF IRRIGATION STRUCTURES

Course Objective:

- To make the student more conversant with the design principles of design glaxis wier, sluice tank,different notches, important structures belongs to irrigation

Design and drawing of the following irrigation structures

1. Sloping glaxis weir.
2. Tank sluice with tower head
3. Type III Syphon aqueduct.
4. Surplus weir.
5. Trapezoidal notch fall.
6. Canal regulator.

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.

Text Books:

1. Design of minor irrigation and canal structures by C.Satyanarayana Murthy, Wiley eastern Ltd.
2. Irrigation engineering and Hydraulic structures by S.K.Garg, Standard Book House.

Courses outcomes:

- Students will learn basic design fundamentals and theory.
- Students will learn primary construction systems.
- Students will learn primary construction methods and materials.
- Students will learn to interpret construction graphics.
- Students will learn basic irrigation skills.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)**

IV Year B. Tech. II Semester

(5G682) ESTIMATION AND QUANTITY SURVEYING

Course Objective:

- The objective of the course is to make the student to understand about estimation and valuations of different types of structures and their valuation as per standard schedule of rates.

UNIT I

GENERAL ITEMS OF WORK IN BUILDING : Standard Units Principles of working out quantities for detailed and abstract estimates – Calculation of quantities of brick work, RCC, PCC, Plastering, whitewashing, colour washing and painting/varnishing for shops, rooms, residential building with flat and pitched roof – Approximate method of estimating.

DETAILED ESTIMATES OF BUILDINGS: Different items of works in building – Principles of taking out quantities – Detailed measurement form – Estimate of RCC building - Long walls – Short wall method and Centre line method – Various types of arches – Calculation of brick work and RCC works in arches.

UNIT II

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.

UNIT III

RATE ANALYSIS: Working out data for various items of work overhead and contingent charges - Task or out – Turn work – Labour and materials required for different works - Rates of materials and labour - 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.

UNIT IV

CONTRACTS AND TENDERS: Contracts: Elements of contract- offer acceptance and consideration - Valid contract - Types of contracts – Lumpsum contract, schedule contract, item rate contract, sub-contracts, joint ventures - Departmental execution of works – Muster Roll Form 21 - Piece work agreement form - Work order.

Tenders: Contract contractor – Quotation - Earnest money – Security money – Tender - Tender notice, tender form - Bidding procedure, irregularities in bidding – Bidding award - Arbitration disputes and claim settlement, e-Tendering procedure.

UNIT V

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.

SPECIFICATIONS: Purpose and method of writing specifications -General specifications - Detailed specifications for different items of building construction.

Text Books:

1. B.N. Dutta, Estimating and Costing, UBS publishers, New Delhi, 2000.
2. G.S. Birdie, Estimating and Costing , Danpatrai Publications, New Delhi, 2009.

Reference Books

1. M. Chakraborti, Estimating Costing Specification and Valuation in Civil Engineering, 23rd Edition, Laxmi Publications, New Delhi, 2010.
2. Standard Schedule of Rates and Standard Data Book, Public Works Department.
3. IS 1200 (Parts I to XXV–1974/ Method of Measurement of Building and Civil Engineering Works – B.I.S.)
4. National Building Code of India – 2010, BIS, Govt. of India, NewDelhi.

Course Outcomes:

- The students should be able to read the detailed drawings and then imagine the appropriate items involved in proposed work.
- The students should be able to prepare preliminary estimate for administrative approval and to check financial feasibility of project.
- The students should be able to understand the required quality of materials and workmanship, accordingly draft the detailed specifications of involved items in work.
- The students should be able to analyze unit rate of items with the current local market rates of materials and labors, and work out the unit costs of items involved in the work.
- The students should be able to apply the unit rates of items and net quantities to prepare the abstract sheet of estimate.
- The students should be able to prepare contract documents, flot tender and select proper agency to actual execution of work. And students should be able to supervise the construction site, prepare running bills and final bill and maintain the accounts of works.