

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES

RAJAMEPET - 516126

(AUTONOMOUS)



www.aitsrajampet.ac.in

DEPARTMENT OF CIVIL ENGINEERING

ACADEMIC REGULATIONS (R17)

AND

COURSE STRUCTURE & SYLLABI

For the students admitted to

B. Tech., Regular Four Year Degree Programme in CBCS

for the Academic Year 2017-18



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.

PROGRAM OUTCOMES(POs) :

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Correlation levels 1, 2 and 3 as defined below:

1: Slightly (Low)

2: Moderate (Medium)

3: Substantial (High)

If there is no correlation, put “-”

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ACADEMIC REGULATIONS

B. Tech, Four Year Degree Programme with CBCS (For the batches admitted from the academic year 2017-18)

and

B. Tech. Lateral Entry Scheme (For the batches admitted from the academic year 2018-19)

The following rules and regulations will be applicable for the batches of Four year B.Tech. degree admitted from the academic year 2017-18 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.
- b) Category-B seats will be filled by the Management as per the norms stipulated by Govt. of Andhra Pradesh.

1.2 Admission into the Second Year of Four year B.Tech. Degree programme (lateral entry):

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. (Civil Engineering)
2. B.Tech. (Mechanical Engineering)
3. B.Tech. (Computer Science and Engineering)
4. B.Tech. (Electrical and Electronics Engineering)
5. B.Tech. (Electronics and Communication 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 professional 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 **22- 28** 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 **I B. Tech. II Semester and III B.Tech. I Semester**):

Interested students who want to supplement their knowledge can opt for audit courses namely Gender sensitization, Professional Ethics/Stress Management & Advanced English Communication 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	03	02
Comprehensive Course	02	02
Seminar	–	01
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 20marks. The question paper shall be of subjective type in which four questions with an internal choice are to be answered. 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: similar to theory examination.
		30	20 Marks for Day to Day evaluation	Performance in laboratory experiments / Drawing practices
			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 Viva Voce	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.

6.4.1 Challenge valuation

Student can apply challenge valuation by paying stipulated fee. The photo copy of the answer booklet shall be given to the student on notified date.

- If the improvement is 15% of maximum marks or more, the new marks will be awarded to the student. Otherwise there will be no change in the old marks

- If the improvement is 15% of max marks or more 90% of the fee paid will be refunded to the student. If the student's status changes from fail to pass, 50% of fee will be refunded to the student. Otherwise the student will forfeit the amount which he/she paid.
- No challenge valuation for Laboratory Examination.

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 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.

6.9 Massive Open Online Course (MOOC):

MOOC is one of the courses introduced in IV year I 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 fulfill 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 2018-2019):

- 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 **143** 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 **143** 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 **195/143 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. It is resolved that a certificate of participation to the extent of 65% attendance is required for the students to become eligible for the award of 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.

13.AMENDMENTS TO REGULATIONS:

The chairman, Academic Council of Annamacharya Institute of Technology and Sciences, Rajampet 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.

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

14.Malpractice Rules

Disciplinary Action for Malpractices/Improper Conduct in Examinations

	Nature of Malpractices/Improper conduct	Punishment
If the candidate		
1	a) Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he/she is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.

	Nature of Malpractices/Improper conduct	Punishment
	b) Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he/she will be handed over to the police and a case is registered against him.
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year.
3	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including laboratory examinations and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he/she will be handed over to the police and a case is registered against him.

	Nature of Malpractices/Improper conduct	Punishment
4	Smuggles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6	Refuses to obey the orders of the Chief Superintendent / Assistant Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his/her person or to any of his/her relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in- charge, or any person on duty in or outside the examination hall or any of his/her relations, or indulges in any other act of misconduct or mischief which result in damage to or	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates are also debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

	Nature of Malpractices/Improper conduct	Punishment
	destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
7	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	If the student belongs to the college, expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining

	Nature of Malpractices/Improper conduct	Punishment
		examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the academic council of the Institute for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators Punishments to the candidates as per the above guidelines. Malpractice identified at Spot center during valuation

The following procedure is to be followed in the case of malpractice cases detected during valuation, scrutiny etc. at spot center.

- 14.1** Malpractice is detected at the spot valuation. The case is to be referred to the malpractice committee. Malpractice committee will meet and discuss/question the candidate and based on the evidences, the committee will recommend suitable action on the candidate.
- 14.2** A notice is to be served to the candidate(s) involved through the Principal to his/her address and to the candidate(s) permanent address regarding the malpractice and seek explanations.
- 14.3** The involvement of staff who are in charge of conducting examinations, invigilators valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing in correct or misleading information) that infringe upon the

course of natural justice to one and all concerned at the examinations shall be viewed seriously and recommended for award of appropriate punishment after thorough enquire.

14.4 Based on the explanation and recommendation of the committee action may be initiated.

15.GENERAL:

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

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(AN AUTONOMOUS INSTITUTION)
DEPARTMENT OF CIVIL ENGINEERING

Regulations :R17

Programme Code: G7

III Year B. Tech., I Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
7G651	Design and Drawing of Reinforced Concrete Structures	3	2	0	3
7G652	Engineering Geology	3	1	0	3
7G653	Environmental Engineering-I	3	1	0	3
7BA51	Managerial Economics and Financial Analysis	3	1	0	3
7G654	Water Resource Engineering -I	3	1	0	3
7G655	Structural Analysis-II	3	1	0	3
7G656	Environmental Engineering Lab	0	--	3	2
7G657	Engineering Geology Lab	0	--	3	2
7G658	Structural analysis and Design Lab-I STAAD PRO	0	--	3	2
7GC52	English for Competitive Examination	--	2	--	1
AUDIT COURSE	Professional Ethics / Stress Management	2	--	--	0
Total		20	09	09	25

III Year B. Tech., II Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
7G661	Concrete Technology	3	1	0	3
7G662	Design and Drawing of steel structures	3	1	0	3
7G663	Estimation and Quantity Surveying	3	1	0	3
7G664	Geotechnical Engineering	3	1	0	3
7G665	Water Resource Engineering-II	3	1	0	3
PROFESSIONAL ELECTIVE -I		3	1	0	3
7G666	Advanced Structural Analysis				
7G667	Environmental Engineering-II				
7G668	Numerical methods in civil Engineering				
7G669	Concrete Technology Lab	0	--	3	2
7G66A	Structural Analysis and Design Lab II – E-TABS	0	--	3	2
7GC61	*Advanced English communication skills lab	0	--	3	2
7G66B	Seminar-II	0	--	2	1
Total		18	06	11	25

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

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DEPARTMENT OF CIVIL ENGINEERING

Regulations :R17

Programme Code: G6

IV Year B. Tech., I Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
7G671	Design and Drawing of Irrigation Structure	3	1	0	3
7G672	Foundation Engineering	3	1	0	3
7G673	Transportation Engineering	3	1	0	3
7G674	Open Elective	3	1	0	3
7G675	MOOCs				3
PROFESSIONAL ELECTIVE –II		3	1	0	3
7G676	Bridge Engineering				
7G677	Finite Element Methods for Civil Engineering				
7G678	Ground Improvement Techniques				
7G679	Geotechnical Engineering Lab	0	--	3	2
7G67A	Transportation Engineering Lab	0	--	3	2
7G67B	Project Management Lab-MS Project/Primavera	0	--	3	2
7G67C	Comprehensive Civil Engineering	0	--	2	1
Total		15	05	11	25

LIST OF OPEN ELECTIVE SUBJECTS		Offered By Department of
7G674	Disaster Management	CE
7G275	System Modelling and Simulation	EEE
7G575	Total Quality Management	ME
7G576	Integrated Product Development	ME
7G376	Industrial Electronics	ECE
7G377	Medical Instrumentation	ECE
7G178	Cyber Laws	CSE
7G179	Principles of programming language	IT
7GA72	Intellectual Property Rights	DBA
7GA71	Human Resource Management	DBA

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DEPARTMENT OF CIVIL ENGINEERING

Regulations :R17

Programme Code: G6

IV Year B. Tech., II Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
PROFESSIONALELECTIVE –III		3	1	0	3
7G681	Advanced Environmental Engineering				
7G682	Green Buildings				
7G683	Prestressed concrete				
PROFESSIONALELECTIVE IV		3	1	0	3
7G684	Advanced RCC Design				
7G685	Construction Planning and Project Management				
7G686	Railway Docks and Harbours Engineering				
PROFESSIONALELECTIVE V		3	1	0	3
7G687	Elements of Earth Quake Resistant Design				
7G688	Ground water Development and Management				
7G689	Remote sensing and GIS				
7G68A	Seminar – III	0	--	2	1
7G68B	Project Work			8	8
Total		09	3	10	18

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

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B. Tech. I Semester

**7G651- DESIGN AND DRAWING OF REINFORCED CONCRETE
STRUCTURES**

L	T	P
4	2	0

Course Objective:

Structural elements are subjected to different loading so to with stand the structures, for external loading we need to design the structures for its safety and serviceability and to impart comprehensive knowledge on the design of reinforced concrete structures.

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: Concept of limit state design – Comparison between two methods- Basic statistical principles – Characteristic loads– Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design – stress - block parameters – limiting moment of Resistance

Unit II

LIMIT STATE DESIGN OF 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

LIMIT STATE DESIGN OF BEAMS: Limit state design of singly reinforced, doubly reinforced and T beam sections.

LIMIT STATE DESIGN OF SLABS: Design of one way slab - Two-way slab, Using I S Coefficients.

Unit IV

LIMIT STATE DESIGN OF COLUMNS: Short and long columns – under axial loads, Uni-axial bending and biaxial bending – I S Code provisions.

Unit V

LIMIT STATE DESIGN OF FOOTINGS: Different types of footings – Design of isolated – square and rectangular footings.

LIMIT STATE DESIGN OF 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 consist 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%. Codes/Tables: IS 456-2000 & SP-16 Charts to be permitted into the examinations Hall.

Text Books:

1. Varghese .P.C, “Limit State Design Of Reinforced Concrete”, 2Nd Ed, PHI Learning Pvt. Ltd., 2004.
2. Fundamentals of reinforced concrete by N.C. Sinha and S.K Roy, S. Chand publishers
3. Reinforced concrete design by S.Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.
4. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishres, New Delhi
5. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad
6. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
7. Relevant IS codes such as IS 456 – 2000,IS 3370(Part-IV), BIS 2000,SP-16

Reference Books:

1. Gambhir .M.L, “Design of Reinforced Concrete Structures”, Prentice Hall of India, Pvt. Ltd., New Delhi, 2008.
2. “Code of Practice for Plain and Reinforced Concrete”, BIS, New Delhi, IS456-2000.
3. “Recommended guidelines for Concrete Mix Design”, BIS, New Delhi, IS 10262 1982.
4. “Design Aids for Reinforced Concrete to IS 456”, Special Publication (SP16), BIS New Delhi,1980.
5. “Code of Practice for Structural use of Unreinforced Masonry,” BIS, New Delhi, IS1905-1987.

Course Outcomes

1. Students would be able to understand the basic concepts of reinforced concrete analysis and design.
2. Students would be able to understand the behavior and various modes of failure of reinforced concrete members.
3. Students would be able to analyze and design various reinforced concrete members like beams & slabs.
4. Students would be able to understand and analyze behavior of columns and their support conditions and detailing of reinforcement for the column.
5. Students would be able to understand and analyze the various types of footing and detailing of reinforcement.

Mapping of CO's & PO's:

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	-	-	3	1	-	2	1	-	-	2	3
2	3	1	3	-	2	-	-	-	-	-	-	1
3		3	3	-	-	-	2	-	-	-	-	2
4	2	1	2	-	-	3	-	-	-	-	-	-
5	1	3	2	-	1	-	-	-	-	-	-	3

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B. Tech. I Semester

-7G652- ENGINEERING GEOLOGY

L	T	P
3	1	0

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 hazards and gives a suitable picture on the Geological aspects that are to be considered for the planning and construction of major Civil Engineering projects.

Unit 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 drawbacks – 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., Tithological, structural and groundwater) in tunneling, over break and lining in tunnels.

TEXT BOOKS

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

REFERENCES

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

1. The students would have the knowledge of principles of Engineering Geology.
2. The students would have the knowledge of properties of soils, various rocks and minerals.
3. The students would be able to judge the suitability of sites for various civil engineering structures.
4. The students would have the knowledge for deciding the suitability of water and soil conservation projects.
5. The students would exhibit the ability to use the knowledge of geological strata in the analysis and design the civil engineering structures.

MAPPING OF COs & Pos

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	3	-	-	3	-	-	3	2	-	2	-
2	3	3	3	2	-	-	-	2	3	-	-	-
3	2	2	-	3	-	-	-	3	2	-	-	-
4	-	-	3	-	3	-	-	2	2	2	3	-
5	-	-	2	2	2	-	-	3	2	3	2	2

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III Year B. Tech. I Semester**7G653 - ENVIRONMENTAL ENGINEERING – I**

L	T	P
3	1	0

Course Objective:

1. To provide the knowledge of sources and collection, conveyance and distribution of waste water and its treatment.
2. To convey the concepts of sewage and its collection, characteristics and treatment.

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: Fundamental Definitions- system of sewerage- classification of sewers- Factors affecting the quantity of sewage, Determination of sewage, flow variation of sewage, Factors affecting the storm water, Determination of rainfall intensity, determination of run-off coefficient, computation of storm water, Design of sewers, Shapes of sewer, sewer materials, sewer appurtenance.

Unit V

SEWAGE CHARACTERISTICS: Fundamental Definitions- Decomposition, Physical and chemical characteristics of Sewage-Determination of solids, Dissolved oxygen- Oxygen and chemical oxygen demand- Biochemical oxygen demand,-Chlorine demand- Carbonaceous demand-Nitrogenous demand.

SEWAGE TREATMENT: Preliminary treatment methods- screening, grit chambers, skimming tank-Primary treatment methods- sedimentation tank-Secondary treatment methods- Trickling Filters, aeration tank, Activated sludge process, oxidation pond, septic tank, Imhoff tank, sludge digestion tank-Tertiary treatment methods- general description

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. Shamma 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:

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

1. Understand the sources of waste water and list out the different population forecasting methods.
2. Understand the collection, conveyance and distribution of waste water.
3. Understand the different treatment processes of waste water.
4. Estimate the quantity of sewage and storm water and Design the sewers.
5. Understand sewage characterizes and treatment methods.

Mapping of COs & POs

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	2	-	-	-	2	3	-	-	-	-	3
2	2	-	-	-	-	2	3	-	-	-	-	3
3	2	-	-	-	-	-	3	-	-	-	-	2
4	2	3	3	-	-	-	3	-	-	-	-	2
5	2	2	2	-	-	2	3	-	-	-	-	2

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III Year B. Tech. I Semester**7BA51 - MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS****(Common to CE, ECE and ME)**

L	T	P
3	1	0

Course Objective:

This course 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:

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

Mapping of COs & POs

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	2	-	-	-	-	-	2	-	-	-	-
2	-	-	-	-	-	-	-	-	-	3	-	2

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III Year B. Tech. CE I Semester

7G654 - WATER RESOURCE ENGINEERING - I

L	T	P
3	1	0

Course Objectives:

1. Engineering Hydrology and its applications like Runoff estimation, estimation of design discharge and flood routing.
2. 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, 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:

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

Mapping of COS & POS

Course Outcomes	Programme outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	-	2	-	-	-	-	-	-	-	-
2	1	1	-	1	-	-	-	-	-	-	-	-
3	1	-	-	1	-	-	-	-	-	-	-	-
4	-	-	-	1	-	-	-	-	-	-	-	-
5	-	1	-	-	-	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B. Tech. I Semester

7G655 - STRUCTURAL ANALYSIS - II

L	T	P
3	1	0

Course Objective:

The main objective of this course is to determine indeterminate structures by using various methods.

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.

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

The Students will be able to

1. Determine the normal thrust, radial shear and bending moment in Two hinged and Three hinged arches and also able to draw shear force and bending moment diagrams.
2. Analyze portable frames using Slope deflection and Moment distribution method and also able to draw shear force and bending moment diagrams.
3. Analyze continuous beams and frames using Kani's method and also able to draw shear force and bending moment diagrams.
4. Analyze continuous beams using Matrix method of Structural analysis and also able to draw shear force and bending moment diagrams.
5. Determine shape factors for various sections and also ultimate moment for different beams.

Mapping of COs & POs:

Course Outcomes	Programme outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	3	-	-	3	-	-	-	-	-	-	-
2	3	3	2	-	3	-	-	-	-	-	-	-
3	3	3	2	2	3	-	-	-	-	-	-	-
4	3	3	2	2	3	-	-	-	-	-	-	-
5	3	3	2	1	3	-	-	-	-	-	-	-

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III Year B. Tech. I Semester**7G656- ENVIRONMENTAL ENGINEERING LAB**

L	T	P
0	0	3

Course Objective:

1. 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**Course outcomes:**

At the end of the course, students would be able to

1. Conduct experiments, interpret and analyze Data, and report results.
2. Identify desired specifications and requirements as per Indian standards of water related to different purposes of utilization.

Mapping of COs & POs:

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	-	3	3	-	-	-	-	3	-	2	3
2	3	-	3	3	-	-	-	-	3	3	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B.Tech. I Semester**7G657 - ENGINEERING GEOLOGY LAB**

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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.
4. Megascopic identification of common igneous rocks.
5. Megascopic identification of common sedimentary rocks.
6. Megascopic identification of common metamorphic rocks.
7. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
8. Simple structural geology problems.

Course Outcomes:

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

1. Study of physical properties and identification of minerals referred under theory. Identify the various rocks, minerals depending on geological classifications
2. Megascopic description and identification of rocks referred under theory.
3. Microscopic study of rocks.
4. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
5. Simple Structural Geology problems.

Mapping of COs & Pos

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	2	-	1	2	-	2	2	-	-	-	2
2	2	-	-	2	1	-	-	2	1	-	-	2
3	-	-	-	-	-	-	-	-	-	-	-	-
4	2	2	-	-	-	-	-	3	-	2	-	-
5	2	-	-	3	-	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B.Tech. I Semester**7G658 - STRUCTURAL ANALYSIS AND DESIGN LAB-I STAAD PRO**

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SOFTWARE:

STAAD PRO or Equivalent

EXERCISES:

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

ANY OF THE EIGHT EXPERIMENTS ARE MANDATORY

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

Course Outcomes:

1. To select the appropriate Structural system for a conventional reinforced concrete Structure.
2. Determine the preliminary designs of structures assuming preliminary dimensions.
3. Apply the fundamentals of reinforced concrete to design structures like retaining walls, water tanks, staircase, and other structures of importance.

Mapping of COs & POs:

Course outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1	3	3	-	3	-	-	3	3	3	-	3
2	-	3	3	2	3	1	1	1	3	-	1	3
3	-	3	3	-	3	1	1	2	-	2	1	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B. Tech. I Semester

7GC52 - ENGLISH FOR COMPETITIVE EXAMINATIONS

(Common to CE, CSE, ME and IT)

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Course Objectives:

1. To equip students with English verbal and reasoning skills in order to help them succeed in exams like GRE, TOEFL and help them to do well in placement drives.
2. To help students improve their knowledge of grammar, vocabulary and reasoning skills pertain to English.

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*.

Course Outcomes:

1. The student will achieve proficiency in English vocabulary with their knowledge of synonyms, antonyms, idiomatic expressions and, accuracy in English spelling, One word Substitutions .
2. The student will be able to apply active reading strategies in order to comprehend, critically analyze and make inferences and predictions based on information in the text
3. The student will be able to apply his/her knowledge of articles, prepositions, tenses and voice correct errors or improve sentences

4. The student will be able to form meaningful sentences/passages out of the scrambled words/sentences.

Mapping of COs & POs:

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	-	-	-	-	-	-	-	-	2	-	3
2	-	-	-	-	-	-	-	-	-	2	-	3
3	-	-	-	-	-	-	-	-	-	3	-	1
4	-	-	-	-	-	-	-	-	-	-	-	3

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B. Tech., II Semester

**PROFESSIONAL ETHICS
(AUDIT COURSE)**

L	T	P
2	0	0

Course Objective:

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

INSTRUCTIONAL OBJECTIVES

1. To understand the relevance of ethics and morals in engineering
2. To appreciate the vulnerability to failure of engineering processes
3. To comprehend the finer aspects of safety and risk with reference to the responsibilities of engineers.
4. To understand the link between responsibility, rights and accountability
5. 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

1. 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. Jayashree Suresh, Raghavan, B.S., “Professional Ethics”, S. Chand & Company Ltd., 2005

Course Outcomes: The students will have the ability to:

1. Understand professional, ethical values and the knowledge of contemporary issues.
2. Excel in competitive and challenging environment and contribute to industry through professional careers.
3. Use the engineering principles to update and maintain the technical skills and continuing their education throughout their professional career.

Mapping of COs & POs

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	-	-	-	3	3	2	-	-	-	-	-
2	-	-	-	-	2	3	3	-	-	-	-	-
3	-	-	-	-	2	2	3	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B. Tech. II Semester

7G661 - CONCRETE TECHNOLOGY

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Course Objective:

1. 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.

Unit II

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.

Unit III

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 Mc grawhill Publishers, New Delhi

Course Outcomes:

1. The Student can identify the functional role of ingredients of concrete.
2. The Student can Acquire and apply fundamental knowledge in the fresh and hardened properties of concrete.
3. The Student will know the importance of various tests to determine strength of concrete.
4. The student can Compute the mix proportions for design as per IS code.
5. The student would be able to comprehend the various types of special concrete.

Mapping of COs & POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	-	-	-	-	3	2	1	-	-	2	3
2	1	2	-	2	2	2	2	2	-	2	2	3
3	-	-	-	-	-	2	2	-	-	-	3	2
4	2	2	3	2	2	1	2	2	-	-	3	2
5	-	2	-	3	2	2	2	1	-	3	3	3

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B. Tech., II Semester

(7G662) DESIGN & DRAWING OF STEEL STRUCTURES

L	T	P
3	1	0

Course Objective:

1. 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 flange plates, 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

DESIGN OF PURLINS: 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.

1. Plate 1 Detailing of simple beams
2. Plate 2 Detailing of Compound beams including curtailment of flange plates.
3. Plate 3 Detailing of Column including lacing and battens.
4. Plate 4 Detailing of Column bases – slab base and gusseted base

5. Plate 5 Detailing of steel roof purlin.
6. 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 consist 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 Pubilishers.
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.

Design Standards Code and steel tables to be permitted into the examination hall.

Course Outcomes:

The Students should able to

1. Understand different types of steel connections and the design philosophies and behavior of structural steel
2. Understand the loads acting on the beam, design of different types of beams and plate girder.
3. Understand the importance and design of tension and compression members.
4. Understand the necessity and design of built up members and column foundations
5. Understand, design the wind loads acting on the structure according to IS 875 part III-design of roof structures for purlin and gantry girder

Mapping of COs & POs:

Course Outcomes	Program outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	2	2	-	3	2	-	-	-	-	-	2
2	2	2	3	-	-	2	-	-	2	-	-	-
3	3	1	-	-	-	1	-	-	-	-	-	-
4	3	3	-	-	-	2	-	-	-	-	--	2
5	2	3	-	-	3	3	-	-	3	-	-	-

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III Year B. Tech., II Semester

7G663 - ESTIMATION AND QUANTITY SURVEYING

L	T	P
3	1	0

Course Objective:

1. 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, New Delhi.

Course Outcomes:

1. To know the importance of preparing the types of estimates of buildings.
2. To prepare quantity estimates for roads and canals.
3. To apply logical thoughts and prepare the rate analysis for different works.
4. To analyze contracts and tenders in construction practices.
5. To evaluate the cost of expenditure and valuation of buildings.

Mapping of COS & POS:

Course Outcomes	Program outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	2	-	2	-	-	-	2	1	-	1	-
2	3	2	-	2	-	-	-	2	1	-	1	-
3	3	2	-	1	-	-	-	2	1	-	1	-
4	2	1	-	2	-	2	-	2	1	-	1	-
5	2	1	-	2	-	-	-	2	1	-	1	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

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III Year B. Tech., II Semester**7G664 - GEOTECHNICAL ENGINEERING**

L	T	P
3	1	0

Course Objective:

1. To impart the fundamental concepts of soil mechanics.
2. To know the importance of index properties like grain size, consistency limits, soil classification.
3. To understand the permeability and seepage through soils.
4. To understand the concept of compaction, consolidation of soils and shear strength.

Unit I

INTRODUCTION: Definition, origin and formation of soil, List of different soil types, Definition of mass, weight- Relation between mass and weight- Units of mass and weight in SI units-Phase Diagram, Voids ratio, Porosity, Percentage Air Voids, Air content, Degree of saturation, Moisture content, Specific gravity, Bulk density, Dry density, Saturated density, Submerged density and their interrelationships -clay mineralogy and soil structure. Numerical problems.

INDEX PROPERTIES OF SOILS AND THEIR DETERMINATION: Index Properties of soils and their significance. Various index properties and their Laboratory determination, -Water content, Specific Gravity, Particle size distribution (Sieve analysis and Hydrometer analysis), Relative density, Consistency limits and their indices, in-situ density, Activity of Clay, Thixotropy of clay, IS classification - Plasticity chart and its importance, numerical problems.

Unit II

PERMEABILITY: Types of soil water – capillary rise – flow of water through soils – Darcy’s law- permeability – Factors affecting permeability – laboratory determination of coefficient of permeability –Permeability of layered systems, numerical problems.

Unit III

SEEPAGE THROUGH SOILS: seepage velocity, Seepage pressure, seepage through soils- total, neutral and effective stresses – quick sand condition — flow nets: characteristics and uses, numerical problems.

STRESS DISTRIBUTION IN SOILS: Importance of estimation of stresses in soils – Boussinesq’s and westergaard’s theories for point loads, stress distribution in different loaded areas-line load, uniformly loaded circular, strip footing, pressure bulb, variation of vertical stress under point load along the vertical and horizontal planes – newmark’s influence chart, numerical problems.

Unit IV

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

CONSOLIDATION: Types of compressibility, Types of compressibility – Immediate settlement – Primary consolidation and secondary consolidation – Stress history of clay, normally consolidated soil, over consolidated soil and under consolidated soil- preconsolidation pressure and its determination- Estimation of settlements -Terzaghi's 1-D consolidation theory – Coefficient of consolidation and its determination, numerical problems.

Unit V

SHEAR STRENGTH OF SOILS: Definition and use of shear strength - Source of shear strength- Normal and Shear stresses on a plane – Mohr's stress circle- Mohr-Coulomb failure theory- Measurement of shear strength, Drainage conditions -Direct shear test, Tri-axial shear test, Unconfined compression test and vane shear test – shear strength of granular soil, shear strength of clay, Factors affecting shear strength of granular soils and clay, Liquefaction-numerical problems.

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 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

Course Outcomes: The student understands

1. Properties of soils such as phase relationships, unit weight, water content, grain size distribution, index properties, methods of soil classifications and compaction characteristics in soils.
2. Concepts of total, neutral and effective stress in soils, principles of Darcy's law, permeability and seepage in soils and their effects in engineering applications.
3. Concepts of stress distribution under varying load conditions using Boussinesq's and Westergaard's theories.

4. Principles of Terzaghi's theory of primary consolidation, settlement in soils and associated properties.
5. shear stress and shear strength properties in soils, Mohr diagrams, and methods of finding the shear strength parameters of soils using direct shear test, unconfined compression test and tri-axial shear tests.

Mapping of COs & POs:

Course Outcomes	Program outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	1	-	-	-	-	-	-	1	-	-	-
2	3	3	-	2	-	-	-	-	-	-	-	2
3	3	1	-	3	2	-	-	-	1	-	2	3
4	2	3	-	3	2	-	-	-	-	-	2	2
5	3	2	-	2	2	-	1	-	-	-	2	3

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B. Tech. II Semester**7G665 - WATER RESOURCE ENGINEERING – II**

L	T	P
3	1	0

Course Objective:

1. 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:

1. Student will be able to prepare elementary profile and hydraulic design of gravity dams.
2. Prepare elementary profile and hydraulic design of earth dams.
3. Seepage concept under hydraulic structures.
4. Hydraulic design of canal drops.
5. Hydraulic design of cross drainage structures.

Mapping of COs & POs:

Course Outcomes	Program outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	1	-	-	-	-	-	-	-	-	-
2	1	2	1	-	-	-	-	-	-	-	-	-
3	1	-	-	-	-	-	-	-	-	-	-	-
4	1	1	1	-	-	-	-	-	-	-	-	-
5	1	1	1	-	-	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B. Tech. II Semester

7G666 - ADVANCED STRUCTURAL ANALYSIS
(PROFESSIONAL ELECTIVE –I)

L	T	P
3	1	0

Course Objectives:

1. Take advantage of a strong technical education at the undergraduate level to embark on successful professional careers. Consistently and successfully apply fundamental Structural Engineering principles within their chosen engineering application areas (such as Aerospace, Civil, Marine, and Mechanical).

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
2. Structural Analysis Vol. I & II by Bhavi Katti Vikas Publications.
3. Matrix structural analysis by T.N.Gayl; Tata Mc.Graw Hill Company

Course Outcomes: The Students will be able to

1. Apply the knowledge for the analysis of simple portal frames, continues beams
2. Determine the normal thrust, radial shear and bending moment in Two hinged and Three hinged arches by using Influence lines.
3. Analyze portable frames using Slope deflection and Moment distribution method and also able to draw shear force and bending moment diagrams.
4. Analyze continuous beams and frames using Matrix method of Structural analysis and also able to draw shear force and bending moment diagrams.
5. Determine shape factors for various sections and also ultimate moment for different beams.

Mapping of COs & POs:

Course Outcomes	Program outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	-	-	3	-	-	-	-	-	-	-
CO2	3	3	2	-	3	-	-	-	-	-	-	-
CO3	3	3	2	2	3	-	-	-	-	-	-	-
CO4	3	3	2	2	3	-	-	-	-	-	-	-
CO5	3	3	2	1	3	-	-	-	-	-	-	-

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III Year B. Tech., II Semester

7G667 - ENVIRONMENTAL ENGINEERING – II
(PROFESSIONAL ELECTIVE – I)

L	T	P
3	1	0

Course Objectives:

1. The emphasis of the course is on the explanation of water ,air and noise pollution
2. The course provides the knowledge on effects of pollution to general health.
3. This course also provides knowledge on solid waste and hazardous waste management..

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, adsorption, ion-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.SureshK.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 PaarneVesilind, Willaiam, Cengage Publications, New Delhi
4. Environmental Engineering by Peavy, Rowe and Tchobanoglous, Tata McGraw Hill publications.
5. Central Pollution Control Board (<http://cpcb.nic.in/>) and Andhra Pradesh.

Course Outcomes:

The students should be able to

1. Understand an overview of air pollution including methods for prevention, control and management of pollution
2. Manage waste water discharged from homes, business and industries to reduce the threat of water pollution.
3. Plan solid waste minimization and design storage, collection, transport, processing and disposal of municipal solid waste.
4. Understand an overview of hazardous waste including methods for prevention, control and disposal of hazardous waste.
5. Understand an overview of noise pollution including methods for prevention, control of pollution.

Mapping of COs & POs:

Course Outcomes	Programme outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	-	-	-	-	2	3	-	-	-	-	3
2	2	-	-	-	-	2	3	-	-	-	-	3
3	2	-	-	-	-	-	3	-	-	-	-	2
4	2	-	3	-	-	-	3	-	-	-	-	2
5	2	-	2	-	-	2	3	-	-	-	-	2

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III Year B. Tech., II Semester

7G668 - NUMERICAL METHODS IN CIVIL ENGINEERING
(PROFESSIONAL ELECTIVE – I)

L	T	P
3	1	0

Course Objectives:

1. This course aims at providing the necessary basic concepts of a few numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology

Unit I

SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS : Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Matrix Inversion by Gauss Jordan method - Eigen values of a matrix by Power method.

Unit II

INTERPOLATION AND APPROXIMATION : Interpolation with unequal intervals - Lagrange's interpolation – Newton's divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton's forward and backward difference formulae.

Unit III

NUMERICAL DIFFERENTIATION AND INTEGRATION Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 rule – Romberg's method - Two point and three point Gaussian quadrature formulae – Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules.

Unit IV

INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS : Single Step methods - Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order equations - Multi step methods - Milne's and Adams-Bashforth predictor corrector methods for solving first order equations.

Unit V

BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS Finite difference methods for solving two-point linear boundary value problems - Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods – One dimensional wave equation by explicit method.

Text books:

1. Grewal. B.S., and Grewal. J.S., "Numerical methods in Engineering and Science", Khanna Publishers, 9th Edition, New Delhi, 2007.
2. Gerald. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia, 6 th Edition, New Delhi, 2006.

References:

1. Chapra. S.C., and Canale.R.P., "Numerical Methods for Engineers, Tata McGraw Hill, 5th Edition, New Delhi, 2007.
2. Brian Bradie. "A friendly introduction to Numerical analysis", Pearson Education, Asia, New Delhi, 2007.
3. Sankara Rao. K., "Numerical methods for Scientists and Engineers", Prentice Hall of India Private, 3rd Edition, New Delhi, 2007.

Course Outcomes:

1. Calculate the roots of linear and non-linear equations by applying various numerical methods/formula.
2. Apply, finite difference technique for ordinary and partial differential equation.
3. Analyze, apply and appreciate the finite difference technique for various types of plate and civil engineering problems.
4. Develop skills in numerical computation by working on numerical examples through different numerical method.
5. Identify the origin of errors and their effect on the accuracy, while applying the various numerical methods and numerical computation.

Mapping of COs & POs:

Course Outcomes	Programme outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	-	2	-	-	-	-	-	-	-	-	-
2	2	-	-	-	-	2	-	-	-	3	-	-
3	3	-	-	-	-	3	-	-	-	-	-	-
4	-	-	-	-	-	2	-	-	-	-	-	3
5	-	-	-	-	-	-	-	-	-	-	-	2

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III Year B.Tech., II Semester

7G669- CONCRETE TECHNOLOGY LAB

L T P
0 0 3

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

Course Outcomes:

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

1. Outline the importance of testing of cement and its properties
2. Assess the different properties of aggregate
3. Summarize the concept of workability and testing of concrete
4. To test the basic properties of ingredients of concrete, fresh and hardened concrete properties.
5. Demonstrate the properties of hardened concrete by non-destructive tests

Mapping of COs & POs

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	-	-	-	-	-	-	-	3	-	2	-
2	-	-	-	-	-	-	-	-	3	3	-	-
3	2	-	-	-	-	-	-	-	3	3	3	-
4	2	-	-	-	-	-	-	-	-	3	-	-
5	2	-	-	-	-	-	-	-	-	3	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B. Tech. II Semester**7G66A- Structural Analysis and Design Lab II - ETABS LAB**

L	T	P
0	0	3

List of Experiments:

1. Basics of Structures and about the ETABS
2. Introduction to various commands of ETABS and their applications in detail.
3. 2D model, analysis and design for different types of Trusses.
4. 2D model, analysis and design for different types of Beams.
5. 2D model, analysis and design for Frames.
6. 3D model, analysis and design for Frames.
7. 3D model and analysis& Design for RC Buildings.
8. 3D model and analysis& Design for Steel.
9. Earthquake load application to RC and steel structures along with the design.
- 10.Design & analysis of Multi storied Building.
- 11.Members grouping
- 12.Design Grouping in Steel structures
- 13.Application of different building codes in the design of concrete and steel structures
- 14.Foundation analysis using SAFE, independent as well as importing results from the ETABS.

ANY OF THE EIGHT EXPERIMENTS ARE MANDATORY**Course Outcomes:**

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

1. Outline the importance ETABS in Analyzing the structures
2. Learn the tools useful for modeling, analyzing, designing a structures
3. Analyze&Design a Building for different loading conditions coming on to the structure.

Mapping of COs & POs:

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	-	-	-	3	-	-	-	-	-	-	-
2	-	2	3	-	3	-	-	1	-	2	-	1
3	-	2	3	-	3	-	-	1	-	2	-	2

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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III Year B. Tech. II Semester

7GC61 -ADVANCED ENGLISH COMMUNICATION SKILLS LAB

L	T	P
0	0	3

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:

1. Computer-aided Language Lab with 60 computer machines, one teacher console, LAN facility and Language Learning software for self-study.
2. 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.

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

SUGGESTED SOFTWARE:

1. It's your Job published by Clarity.
2. Business Writing published by Clarity.
3. Active Listening published by Clarity.
4. Active Reading published by Clarity.
5. Software published by Globberana.
6. Cambridge Advanced Learner's Dictionary.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B. Tech. I Semester**7G671- DESIGN AND DRAWING OF IRRIGATION STRUCTURES**

L	T	P
3	1	0

Course Objective:

1. To make the student more conversant with the design principles of design glacis wier, sluice tank,different notches, important structures belongs to irrigation

Design and drawing of the following irrigation structures

1. Sloping glacis 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.

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

1. Design fundamentals of Sloping glacis weir.
2. Design fundamentals of Tank sluice with tower head.
3. Design fundamentals of Type III Syphon aqueduct
4. Design fundamentals of Surplus weir.
5. Design fundamentals of Canal regulator

Mapping of COs& POs

Course Outcomes	Programme outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	-	-	-	-	2	3	-	-	-	-	-
2	2	-	-	-	-	2	3	-	-	-	-	-
3	2	-	-	-	-	-	3	-	-	-	-	-
4	2	-	3	-	-	-	3	-	-	-	-	-
5	2	-	2	-	-	2	3	-	-	-	-	-

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IV Year B. Tech. I Semester

7G672 - FOUNDATION ENGINEERING

L	T	P
3	1	0

Course Objective:

1. 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 exploration 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: : Lateral earth pressure theory, Different types of earth pressures, Rankine's active and passive earth pressures, pressure distribution diagram for lateral earth pressures against retaining walls for different conditions in cohesionless and cohesive soils, Coulomb's earth pressure theory, Graphical techniques- Rebhan's and Culmann's construction.

Unit III

RETAINING WALLS: Types of retaining walls-Design of Gravity and cantilever retaining walls – stability of retaining walls.

SHALLOW FOUNDATION- functions and requisites - Different types - choice of foundation type - general principles of design. Bearing capacity - types of failures –Bearing capacity analysis by Terzaghi's, meyerhoff and skempton's analysis - Bearing capacity based on settlement and building codes.

Unit IV

BEARING CAPACITY OF FOUNDATION:Bearing capacity – Basic Definitions, Factors affecting bearing capacity, Estimation of Bearing capacity by different methods, Analytical measures–Terzaghi's, Meyerhof and skempton's methods and calculations, Field measures – SPT, CPT and Plate load tests.

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&ManojDatta – Tata Mc.Graw Hill Publishing company New Delhi. 2005.
5. Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.

Course Outcomes:

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

1. Plan the Geotechnical exploration program for major civil engineering structure.
2. Analyze the stability of slopes and solve the field problems.
3. Predict the earth pressure over the earth resisting structures and their Geotechnical design.
4. Geotechnical designs and select type of shallow foundations.
5. Geotechnical design their stability, and efficiency of deep foundations.

Mapping of COs & POs:

Course Outcomes	Program outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	-	-	2	-	3	3	-	-	-	-	2
2	2	3	-	2	-	3	3	-	-	-	-	2
3	3	3	-	2	-	3	3	-	-	-	-	2
4	-	3	-	2	-	3	3	-	-	-	-	2
5	-	3	-	2	-	3	-	-	-	-	-	-

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IV Year B. Tech., I Semester

7G673 - TRANSPORTATION ENGINEERING

L	T	P
3	1	0

Course Objective:

1. It deals about the history of highway development, surveys and classification of roads.
2. To study about the geometric design of highways, traffic characteristics and design of intersections.
3. To know about the pavement materials and design.

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 Materials and Mix Design: Subgrade soil properties, CBR test, plate bearing test, aggregates, desirable properties, tests, bituminous materials, bitumen and tar, tests. Bitumen Emulsion, cutback bitumen, bituminous mixes, design, Marshall Method.

Unit V

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.

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. A Text book of Transportation Engineering by S.P.Chandola, S.Chand Publications, New Delhi.

Reference Books:

1. Highway Engineering – S.P.Bindra ,DhanpatRai& Sons. – 4th Edition (1981)
2. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna publications – 6th Edition – 1997.
3. Introduction to Transportation Engineering by James.H.Banks, Tata Mc.Grawhill Edition, New Delhi
4. Traffic and Highway Engineering Nicholas.J.Garber&Lester A.Hoel
5. High way engineering by Paul .H.Wright& Karen K.Dixon,wileyindia limited.

Course Outcomes: After completion of the course, the student will be able

1. To Plan highway networks, carry out surveys involved in planning, highway alignment, and highway geometrics.
2. To understand the various traffic management plans.
3. To design intersections and to reduce point of conflict at intersections.
4. To design flexible and rigid pavements.
5. To Prepare structural designs of runway and taxiway.

Mapping of COs & POs:

Course Outcomes	Program outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	-	-	-	-	2	-	-	-	3	-	2
CO2	-	-	-	-	2	-	-	-	-	2	-	3
CO3	-	3	2	-	-	1	-	2	-	2	-	3
CO4	-	2	2	-	-	-	-	-	2	3	-	3
CO5	-	-	2	-	-	1	-	-	1	3	-	3

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IV Year B. Tech. I Semester

7G676 - BRIDGE ENGINEERING
(PROFESSIONAL ELECTIVE – II)

L	T	P
3	1	0

Course Objective:

1. 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 Ponnuswamy, TATA Mcgraw Hill Company, New Delhi.
2. Design of Bridges by N.KrishnamRaju, Oxford & IBH, Publishing Company Pvt.ltd., Delhi.
3. Design of Bridges Structure by T.R.Jagadish&M.A.Jayaram Prentice Hall of India Pvt., Delhi.
4. Design of Bridges Structure by D.J.Victor
5. Relevant – IRC & Railway bridge Codes.

Reference Books:

1. Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
2. Design of Steel structures by Ramachandra.
3. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.

Course Outcomes:

After completion of the course, the student will be able to

1. Implement standard loading specifications for bridge designs followed by IRC codes, Analyze and perform design of Box culvert.
2. Analyze and perform design of RC slab culverts and RC T-Beam Bridges.
3. Analyze and perform design of plate Girder Bridge and composite bridges.
4. Design various types of bearings and joints in bridge structures.
5. Analyze and design various elements of sub-structures of a bridge.

Mapping of COs & POs:

Course Outcomes	Program outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	3	3	-	-	-	1	2	-	-	-	-
2	-	3	3	-	-	-	1	1	-	-	-	-
3	-	3	3	-	-	-	1	1	-	-	-	-
4	-	3	3	-	-	-	2	1	-	-	-	-
5	-	3	3	-	-	-	1	1	-	-	-	-

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

IV Year B. Tech. I Semester

**7G677 - FINITE ELEMENT METHODS FOR CIVIL ENGINEERING
(PROFESSIONAL ELECTIVE II)**

L	T	P
3	1	0

Course objective:

1. The subject should enable the students to learn the principles involved in discretization in finite element methods, forming of strain displacement and stiffness matrices for simple elements, to know the various approaches followed in finite element analysis, usage of the various elements for discretization and to learn about shape functions.

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 element analysis in Engineering by S.Md.Jalaludeen –Anuradha publications-Chennai.
2. Finite Elements Methods in Engineering by Tirupati. R. Chandrnpatla and Ashok D. Belegundu – Pearson Education Publications.
3. Finite element analysis by S.S. Bhavakatti-New age international publishers
4. Finite element analysis in Engineering Design by S.Rajasekharan, S.Chand Publications, New Delhi.
5. Finite Element analysis – Theory & Programming by C.S.Krishna 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:

1. An ability to understand the fundamental principles and approaches for finding FEM issues in several fields and an ability to unravel the connection for essential relationships in plane stress and plane strain condition.
2. An ability to understand and derive stiffness matrices and form functions for bar and beam elements.
3. An ability to formulate the stiffness matrices for 3noded and 4noded elements.
4. An ability to understand the formulation for CST element, lagrangian and serendipity elements.

An ability to solve the numerical integration functions by applying the gauss rules.

Mapping of COs & POs:

Course outcomes	Programme outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	2	2	-	-	-	-	-	-	-	-	-
2	2	1	-	-	-	-	-	-	1	-	-	-
3	1	3	-	-	-	-	-	-	-	-	-	-
4	2	-	-	-	-	-	-	-	-	-	-	-
5	3	-	-	-	-	-	-	-	2	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B. Tech. I Semester

(7G678 - GROUND IMPROVEMENT TECHNIQUES
(PROFESSIONALELECTIVE –II)

L	T	P
3	1	0

Course Objective:

1. 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:

1. Identify ground conditions and suggest remedial measures of ground improvement.
2. Design and identify the degree densification methods used in soils.
3. Understand the methods of soil stabilization techniques used in ground improvement.
4. Understand the Design principles of soil reinforcement and confinement in engineering constructions.
5. Learn different methods and remedial measures for expansive soils.

Mapping of COs & POs:

Course Outcomes	Program outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	-	-	1	-	-	-	-	-	-	-
2	3	3	-	3	2	-	-	1	-	-	-	-
3	2	1	-	2	2	-	-	1	-	-		2
4	2	1	-	2	2	-	-	1	-	-	-	2
5	2	-	-	3	3	-	-	2	-	-	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B. Tech. I Semester

7G679 - GEOTECHNICAL ENGINEERING LAB

L T P
0 0 3

Course Objective:

1. 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.

Course Outcomes:

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

1. Determine the Index properties of soils.
2. Learn and acquire knowledge to classify soils.
3. To understand the techniques, skills and modern engineering tools necessary for Engineering practice.
4. Determine Engineering properties of soils.

Mapping of COs & POs

Course Outcomes	Program outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	3	3	2	-	-	-	1	-	1	-	3
2	-	-	2	1	-	-	-	2	-	-	2	2
3	2	2	2	-	-	-	-	2	-	-	3	-
4	-	3	-	-	-	-	-	-	-	-	1	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B. Tech. I Semester**7G67A - TRANSPORTATION ENGINEERING LAB**

L T P
0 0 3

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

Course Outcomes: After completion of the course, the student will be able

1. To Perform quality control tests on pavements and pavement materials
2. To recognize the knowledge about different physical properties of aggregates by performing different test on road aggregates.
3. To understand the different important engineering properties of road material like aggregate and binding materials
4. Student knows the techniques to characterize various pavement materials through relevant tests.

Mapping of COS & POS

Course Outcomes	Program outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	2	-	-	-	-	-	-	2	3	1	3
2	3	-	-	-	-	-	-	-	-	2	-	3
3	3	3	-	-	-	-	-	-	-	2	-	3
4	3	2	-	-	-	-	-	-	2	3	1	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B. Tech. I Semester

7G67B - PROJECT MANAGEMENT LAB-PRIMAVERA

L	T	P
0	0	3

Course Objective:

1. This course provides hands-on training for Primavera software. Students will go through the project life cycle of planning. Topics include adding activities, assigning resources, and creating a baseline. Participants also gain a thorough background in the concepts of planning and scheduling.

List of Experiments:

1. Data, Navigating, and Layouts
2. Enterprise Project Structure
3. Creating a Project
4. Creating a Work Breakdown Structure
5. Adding Activities
6. Creating Relationships
7. Scheduling
8. Assigning Constraints
9. Maintaining the Project Documents Library
10. Formatting Schedule Data
11. Roles and Resources
12. Assigning Roles
13. Assigning Resources and Costs
14. Analyzing Resources
15. Optimizing the Project Plan
16. Base lining the Project Plan

Course Outcomes:

1. At the end of the course the student will be able to:
2. Know the what are different Tasks present in the software and how to use them.
3. Learn the Activities and events from the project.
4. Create bar diagrams and gratt charts and Scheduling a project.
5. Analyze the project data.
6. learning the controlling of a project.

Mapping of COs & POs:

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	-	-	-	3	-	-	-	-	-	-	-
2	2	-	-	-	2	-	-	-	-	-	-	-
3	-	2	-	-	2	-	-	-	-	2	2	-
4	-	2	-	3	-	1	-	-	-	-	3	2
5	-	-	-	-	-	2	-	-	2	2	3	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B. Tech. I Semester

7G674 - DISASTER MANAGEMENT
(OPEN ELECTIVE)

L	T	P
3	0	0

Course Objectives:

1. The course is intended to provide a general concept in the dimensions of disasters caused by nature beyond the human control as well as the disasters and environmental hazards induced by human activities with emphasis on disaster preparedness, response and recovery.

Unit I

INTRODUCTION - Concepts and definitions: disaster, hazard, vulnerability, risk, capacity, 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

1. The students increase the knowledge and understanding of the disaster phenomenon and, its factors.
2. The students must learn various classification of disasters hazard and vulnerability profile of India.
3. The students will learn impacts, global and national disaster trends.
4. The students will learn disaster management cycle and its phases and DRR programmes in India and activities of national disaster management academy.
5. The students should be able to analyze factors affecting vulnerability of developmental projects and environmental modifications for sustainable development.

Mapping of COs & POs:

course outcomes	Programme outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	-	-	-	2	1	-	2	2	2	-	-
2	1	-	-	-	-	-	-	2	3	3	-	2
3	1	-	-	-	-	3	-	3	2	2	-	-
4	-	-	-	-	-	-	-	3	3	3	-	2
5	1	-	-	-	-	-	2	3	-	-	-	3

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

IV B. Tech. I Semester**7G275 - SYSTEM MODELLING & SIMULATION****(OPEN ELECTIVE)**

L	T	P
0	0	3

Course Objectives:

The course aims to provide the student with the ability

1. To understand the basic system concepts and definitions of system.
2. Techniques to model and to simulate various systems.
3. 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:

1. Systems Simulation – Geoffrey Gordon, PHI, 1978.

COURSE OUTCOMES: At the end of the Course the student will be able to

1. Define basic concepts in Modeling and Simulation.
2. Understand the fundamental logic, structure, components and management of simulation modeling & demonstrate knowledge of how to use arena
3. Classify various simulation models and give practical examples for each category
4. Generate and test random number varieties and apply them to develop simulation models
5. Analyze output data produced by a model and test validity of the model
6. Perform statistical analysis of output from terminating simulation

Mapping of COs & POs:

Course Outcomes	Program Outcomes												
	1	2	3	4	5	6	7	8	9	10	11	12	
1	3	3	3	3	3	3	3	3	3	3	3	3	-
2	3	3	3	3	3	3	3	3	3	3	3	1	-
3	3	3	3	3	3	3	3	3	3	3	3	3	-
4	3	3	3	3	3	3	3	3	3	3	3	3	-
5	3	3	3	3	3	3	3	3	3	3	3	3	-
6	3	3	3	3	3	2	-	2	2	2	2	2	2

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B. Tech. I Semester

**7G575 – TOTAL QUALITY MANAGEMENT
(OPEN ELECTIVE)**

L	T	P
3	1	0

Course Objectives:

The course aims to provide the student with the ability

1. To demonstrate knowledge of quality management principles, techniques and philosophies.
2. To apply statistical process control techniques to improve the quality.
3. To demonstrate knowledge of TQM tools for industries.
4. To apply appropriate techniques for reliability assessment.
5. 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:

1. Understand the concept of quality management principles, techniques and philosophies.
2. Understand how to apply statistical process control techniques to improve the quality
3. Can able to demonstrate knowledge of TQM tools for industries.
4. Able to apply appropriate techniques for reliability assessment.
5. Understand the concept of advanced techniques for reliability engineering.

Mapping of COs and POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	-	-	-	-	-	-	3	-	-	3	3
2	3	3	-	-	-	-	-	3	-	-	3	3
3	3	3	-	-	-	-	-	3	-	-	3	3
4	3	3	-	-	-	-	-	3	-	-	3	3
5	3	-	-	-	-	-	-	3	-	-	3	3

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B. Tech. I Semester

**7G576 – INTEGRATED PRODUCT DEVELOPMENT
(OPEN ELECTIVE)**

L	T	P
3	1	0

Course objectives:

The course aims at providing the basic concepts of product design, product features and its architecture so that student can have a basic knowledge in the common features a product has and how to incorporate them suitably in product.

Unit I

INTRODUCTION: Introduction, Characteristics of successful product development, Product development team composition, Challenges of Product Development, Product Development process details, Concept Development: The Front-End Process.

Unit II

IDENTIFYING CUSTOMER NEEDS: -Gather raw data from customers, Documenting interactions with customers –Interpret Raw Data in Terms of Customer Needs -Organize the Needs into a Hierarchy -Establish the Relative Importance of the Needs -Reflect on the Results and the Process -Product Specifications, Establishing Target Specifications using four steps.

Unit III

CONCEPT GENERATION, SELECTION & TESTING: Concept generation activity, Five Step method-Clarify the Problem -Search externally – Search Internally – Systematic Exploration – Effect on the Solutions and Processes.

CONCEPT SELECTION: Different methods for choosing a concept – Benefits of structural method of choosing a concept – Selection methodology – Concept Screening -Concept Scoring – Caveats.

CONCEPT TESTING: Seven step method for testing product concepts.

Unit IV

INDUSTRIAL DESIGN: What Is Industrial Design?, Assessing the Need for Industrial Design, How Does Industrial Design Establish a Corporate Identity?, Industrial Design Process - Impact of Computer-Based Tools on the ID Process - Management of the Industrial Design Process -Assessing the Quality of Industrial Design.

Unit V

DESIGN FOR MANUFACTURING AND PRODUCT DEVELOPMENT: Definition - Estimation of Manufacturing cost- Component costs, Assembly cost, Overhead cost, Transportation costs – Component costs reduction methods - Reducing the component assembly costs – Reducing the costs of supporting production - Assessing the impact of DFM decisions on other factors.

PROTOTYPING: Principles of prototyping - Prototyping technologies – Steps involved in prototyping.

TEXT BOOK:

4. Product Design and Development, Karl T.Ulrich and Steven D.Eppinger, McGraw –Hill International Edns.1999

REFERENCES:

1. Concurrent Engg./Integrated Product Development. Kemneth Crow, DRM Associates, 6/3,ViaOlivera, Palos Verdes, CA 90274(310) 377-569,Workshop Book
2. Effective Product Design and Development, Stephen Rosenthal, Business One Orwin, Homewood, 1992,ISBN, 1-55623-603-4
3. Tool Design – Integrated Methods for successful Product Engineering, Stuart Pugh, Addison Wesley Publishing,Neyourk,NY,1991, ISBN 0-202-41639-5
4. www.me.mit/2.7444 PD7202 P

Course outcomes: On completion of the course the student will be able to

1. Understand the overall processes involved in developing the new product.
2. Understand the integration of customer requirements in product design.
3. Apply structural approach to concept generation, selection and testing.
4. Understand various aspects of design such as industrial design.
5. Understand the concepts of design for manufacture, and prototype development.

Mapping of COs and POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	3	3	3	-	-	3	-	-	2	-	3
2	3	-	-	-	-	3	3	-	-	2	-	3
3	3	3	3	3	-	3	3	-	-	-	-	3
4	3	3	3	3	-	3	3	-	-	-	-	3
5	3	3	3	3	-	-	-	-	-	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B. Tech. I Semester

7G376 - INDUSTRIAL ELECTRONICS
(OPEN ELECTIVE)

L	T	P
3	1	0

Course Objectives:

- To get an overview of different types of power semi-conductor devices and their switching characteristics.
- To understand the operation, characteristics and performance parameters of controlled rectifiers.
- To study the characteristics of DC and AC drives
- To learn the different modulation techniques of pulse width modulated inverters and to understand the harmonic reduction methods.

Unit I

POWER DEVICES: Power diode – Power transistor – Power MOSFET – SCR – TRIAC – GTO – IGBT – MCT – Protection of power devices.

Unit II

CONVERTERS: Introduction to half wave, full wave and bridge rectifiers – Single phase and three phase – Half controlled and fully controlled converters – Dual converters – Introduction to cyclo converters and ac controllers.

Unit III

INVERTER AND HOPPER: Voltage, current and load commutation – Voltage Source Inverter (VSI) – Series and Parallel inverter – Bridge inverters – Single and three phase – Voltage control using PWM – Current Source Inverter (CSI) – Choppers – Step up and step down choppers – Chopper classification – Class A, B, C, D, E – AC choppers.

Unit IV

DC AND AC DRIVES : Steady state characteristic of dc motors – Control of DC motor using converters and choppers – Regenerative and dynamic braking – Closed loop control scheme – Speed-torque characteristic of induction motor – Static stator voltage control – V/f control – Static rotor resistance control – Slip power recovery scheme – Self-control of synchronous motor.

Unit V

OTHER APPLICATIONS: Electronic timers – Digital counters – Voltage regulators – Online and offline ups – Switched mode power supply – Principle and application of induction and dielectric heating.

TEXT BOOK:

1. G. K. Mithal, “Industrial Electronics”, Khanna Publishers, Delhi, 2000.

Reference Books:

1. M. H. Rashid, “power Electronics Circuits, Devices and Application”, PHI, 3rd edition, 2004.
2. G. M. Chute and R. D. Chute, “Electronics in Industry”, McGraw Hill Ltd, Tokyo, 1995.
3. F. D. Petruzulla, “Industrial Electronics”, McGraw Hill, Singapore, 1996.

Course Outcomes: The students are able to acquire

1. Knowledge on different power devices and inverters
2. Understand the concepts of DC and AC drives.
3. Knowledge on different applications of Industrial electronics

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	2	3	3	2	-	-	-	-	-	-	-
2	2	2	2	-	2	-	-	-	-	-	-	-
3	2	-	2	-	2	-	-	-	-	2	-	-

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B. Tech. I Semester

**7G377 - MEDICAL INSTRUMENTATION
(OPEN ELECTIVE – I)**

L	T	P
3	0	0

Course Objectives:

The course aims to provide the student with the ability

1. To learn the fundamentals of Electro neurogram and Blood Pressure.
2. 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 OXIMETR: 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

1. Learn the basics of Human being Bio potentials.
2. Know the fundamentals of Blood flow and volume measurement.

Mapping of COs & POs:

Course Outcomes	Programme outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	2	2	2	3	2	-	-	-	-	-	2
2	2	2	2	2	3	2	-	-	-	-	-	2

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B. Tech. I Semester

**7G178- CYBER LAWS
(OPEN ELECTIVE)**

L	T	P
3	0	0

Course Objectives:

1. To explain the basic information on cyber security.
2. To understand the issues those are specific to amendment rights.
3. To have knowledge on copy right issues of software's.
4. To understand ethical laws of computer for different countries.
5. To understand legal aspects of Cyber security.

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 CyberSecurity", Cambridge University Press, 2006.

Course Outcomes:

At the end of the course, students should be able to:

1. Critically evaluate ongoing developments in law relating to information technologies
2. Display an understanding of how these developments relate to one another.
3. Examine areas of doctrinal and political debate surrounding rules and theories;
4. Evaluate those rules and theories in terms of internal coherence and practical outcomes;
5. Draw on the analysis and evaluation contained in primary and secondary sources.

Mapping of COs and POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	2	3	2	-	-	-	3	-	3	-	1
2	-	2	3	2	-	-	-	3	-	3	-	1
3	-	2	3	2	-	-	-	3	-	3	-	1
4	-	2	3	2	-	-	-	3	-	3	-	1
5	-	2	3	2	-	-	-	3	-	3	-	1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET
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IV B. Tech. I Semester

7G179 - PRINCIPLES OF PROGRAMMING LANGUAGES

(OPEN ELECTIVE)

L	T	P
3	1	0

Course Objectives:

1. To understand the types of programming languages, syntax and semantics.
2. To demonstrate the principles of data types and expressions.
3. To define compound statements and fundamentals of sub programs.
4. To analyze data abstraction and Exception Handling in Ada, C++, Java.
5. To explain basics & applications of functional and logic programming.

Unit I

Preliminary Concepts: Reasons for studying, concepts of programming languages, Programming domains, Language Evaluation Criteria, influences on Language design, Language categories.

Programming Paradigms: Imperative, Object Oriented, functional Programming, Logic Programming, Programming Language Implementation-compilation and virtual machines, Programming environments.

Syntax and Semantics: General Problem of describing Syntax and Semantics, formal methods of describing syntax, BNF, EBNF for common programming languages features, parse trees, ambiguous grammars, attribute grammars, Denotational semantics and axiomatic semantics for common programming language features.

Unit II

Data types: Introduction, primitive, character, user defined, array, associative, record, union, pointer and reference types, design and implementation uses related to these types, Names, Variable, concept of binding, type checking, strong typing, type compatibility, named constants, variable initialization.

Expressions: Arithmetic, relational and Boolean expressions, Short circuit evaluation mixed mode assignment, Assignment Statements.

Unit-III

Control Structures: Compound Statements, Selection, Iteration, Unconditional Statements, guarded commands.

Subprograms and Blocks: Fundamentals of sub-programs, Scope and lifetime of variable, static and dynamic scope, Design issues of subprograms and operations, local referencing environments, parameter passing methods, overloaded sub-programs, generic sub-programs, parameters that are sub-program names, design issues for functions, user defined overloaded operators, co routines.

Unit IV

Abstract Data types: Abstractions and Encapsulation, introductions to data abstraction, design issues, language examples, C++ parameterized ADT,

Exception handling: Exceptions, exception Propagation, Exception handler in Ada, C++ and Java.

Unit V

Logic Programming Language: Introduction and overview of logic programming, basic elements of prolog, application of logic programming.

Functional Programming Languages: Introduction, fundamentals of FPL, LISP, ML, Haskell, application of Functional Programming Languages and comparison of functional and imperative Languages.

Text Books:

1. Concepts of Programming Languages Robert W. Sebesta, Pearson Education, Eighth Edition 2008.
2. Programming Languages-Louden,second edition, Thomson.

References:

1. Programming Languages-Ghezzi, 3/e,John Wiley.
2. Programming Languages Design and implementation-Pratt and Zelkowitz, Fourth Edition PHI/Pearson Education.
3. Programming Languages-Watt,WileyDreamtech.
4. LISP, Patric Henry Winston and Paul Horn, Pearson Education.
5. Programming in PROLOG Clocksin, Springer.

Course Outcomes:

After completion of this course, the student will be:

1. Able to select the required programming language for their application.
2. Able to summarize the principles of data types and expressions.
3. Able to make use of control structures and sub programs.
4. Able to apply Abstract data types and Exception Handling.
5. Able to compare different types of programming languages.

Mapping of COs & POs

Course Outcomes	1	2	3	4	5	6	7	8	9	10	11	12
1	-	-	3	3	-	-	-	-	3	-	-	3
2	-	-	3	3	-	-	-	-	-	-	-	3
3	-	3	-	3	-	-	-	-	3	-	-	3
4	-	3	3	-	-	-	-	-	3	-	-	-
5	-	3	3	3	1	-	-	-	3	-	-	3

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IV Year B. Tech. I Semester

7GA72 - INTELLECTUAL PROPERTY RIGHTS
(OPEN ELECTIVE)

L	T	P
3	1	0

Course Objectives:

1. This course is aimed at familiarizing students with the nuances of Intellectual Property Rights (IPR).
2. This course is to help them integrate the IPR process in their academic, research (project) activities and to facilitate the students to explore career options in IPR.
3. 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; . 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

COPY RIGHTS & TRADE MARKS: Copy Right: Meaning of Copyright, Copyright in literary, dramatic, musical work and cinematograph films Ownership, Assignment, Author’s special rights, Importation and infringement, **Trademarks:** Definition; conception of trade marks, Registration, Distinction between trademark and property mark, Standards of proof in 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:

1. Intellectual Property Rights: Basic Concepts, MMS Karki, Atlantic, 2009.
2. Intellectual Property Rights, Pandey, Neeraj, Dharani, Khushdeep.
3. Intellectual Property Rights in India: General Issues and Implications, Dr. Pran krishna Pal, Regal Series.
4. Intellectual Property, W. R. Cornish, Sweet & Maxwell, London, 2012.
5. Principles of Intellectual Property, N.S. Gopala krishnan & T.G.Agitha , Eastern Book Company,Lucknow,2009.

Course Outcomes :

Upon successful completion, students will have the knowledge and skills to:

1. have an understanding of the fundamental legal principles relating to confidential information, copyright, patents, designs, trademarks and unfair competition;
2. The students will able to understand the issues related to intellectual properties.
3. They get awareness of acquiring the patent and copyright for their innovative works.
4. Demonstrate knowledge and understanding of the justifications and rationales for protecting intellectual property
5. Demonstrate knowledge and understanding of the core doctrines of intellectual property law
6. be able to identify, apply and assess principles of law relating to each of these areas of intellectual property;
7. understand the legal and practical steps needed to ensure that intellectual property rights remain valid and enforceable;
8. understand current and emerging issues relating to the intellectual property protection, including those relating to indigenous knowledge or culture, information technology especially the distribution of material on the internet,

Mapping of COs & POs:

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	1	-	-	-	1	-	-	-	-	3	2
2	-	-	-	-	-	3	2	3	-	-	-	-
3	2	-		1	-	-	-	-	3	-	2	-
4	4	-	2	1	1	-	-		3	-	-	-
5	-	2	2	1	2	6	-	-	-	2	-	6
6	-	-	4	-	-	-	-	7	-	-	-	-
7	-	-	-	5	-	6	-	-	6	-	6	-
8	-	5	-	-	-	-	-	-	-	-	8	-

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IV Year B. Tech. I Semester

7GA71 - HUMANRESOURCEMANAGEMENT
(OPEN ELECTIVE)

Course Objective

1. To understand the functioning of human resource management and HR concepts in an organizational setting.
2. To conduct a job analysis and produce a job description from the job analysis.
3. To providing a basic legal and conceptual framework for managers and evaluate the procedures and practices used for recruiting and selecting suitable employees.
4. To have knowledge on practices and techniques for evaluating performance, career planning, training and mentoring people at complex workplace.
5. To be aware of manpower planning, compensation and employee relations.

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, Selection Procedure, 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., Career stages and Development.

Unit V

COMPENSATING, MAINTAINING AND EVALUATING THE MAN POWER: Compensation-Objectives, components of pay structure in India, Types of compensation. **Maintenance**- Industrial Relations and Collective Bargaining. **Evaluation** - Performance Appraisal -Definition, Process and Methods of Performance Appraisal.

Reference Books:

1. NoeA. RaymondJohnHollenbeck, BarryGerhartandPatrickWright-Human Resource Management, (Tata Mc Graw Hill.).
2. Ian Beard well & Len Holden – Human Resource Management, (Mac millan India Ltd.).
3. Aswathappa K-Human Resource and Personnel Management Tata McGraw Hill, 5thEd.).
4. Rao VSP –Human Resource Management, Textand Cases (Excel Books, 2nd Ed.).
5. Ivansevich–Human Resource Management (TataMcGrawHill,10thEd.).
6. Dessler–Human Resource Management (PrenticeHall,10thEd.).
7. Bernardi–Human Resource Management (TataMcGrawHill,4thEd.).
8. Human Resource Management, T.N Chhabra ,Dhanpat Rai & Sons Pvt Ltd.

Course Outcomes:

1. Student will be able to list out the basic HR concepts
2. Student will be familiarized with the ethical standards of the organization.
3. Student will be able to interrelate the different processes of recruitment, selection, performance appraisal and compensation.
4. Students can easily evaluate the development of man power and have better career planning.
5. Student will be able to utilize the manpower effectively after entering the organization.

Mapping of COs & POs:

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	1				1					3	2
CO2						3	2	3				
CO3	2			1					3		2	
CO4			2	1	1				3			
CO5		2	2	1	2					2		

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B. Tech. II Semester

**7G681 - ADVANCED ENVIRONMENTAL ENGINEERING
(PROFESSIONALELECTIVE –III)**

L	T	P
3	1	0

Course Objective:

1. 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 Illiyan.

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 al; 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:

After completion of the course, the students should be able to

1. The ability to apply various water treatment techniques based on quality of water.
2. Evaluate the self-purification concept and impact of pollutants on stream water.
3. Analyze the advanced waste water treatments and its disposal.
4. Understand the concept of Biological waste water treatment.
5. Understand Air pollution treatment, solid & hazardous waste management, biomedical waste management and plastic waste management.

Mapping of COs & POs:

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	2	-	2	2	2	2	-	-	-	-	-
2	2	-	2	3	-	2	3	-	-	-	-	2
3	3	2	2	2	-	2	2	-	-	-	-	2
4	2	-	-	2	-	3	2	-	-	-	-	2
5	3	2	-	2	-	2	-	-	-	-	-	3

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IV Year B. Tech. II Semester

7G682 - GREEN BUILDINGS
(PROFESSIONAL ELECTIVE –III)

L	T	P
3	1	0

Course Objective:

1. 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, Indore air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels.

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:

At the end of the course, the students should able to:

1. Concept of Green Building materials and Sustainable Features.
2. Understand the Green Building concepts and practices in India.
3. The concept of Reduce Energy Demand and Use Onsite Sources.
4. Design and modeling of air conditioning Interior lighting systems.
5. Understand the material conservation handling of non process wastes in Green Building.

Mapping of COs & POs:

Course Outcomes	Programme outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	-	2	-	-	2	2	-	-	-	-	-
2	2	-	2	-	-	2	2	-	-	-	-	-
3	2	-	3	-	-	2	1	-	-	-	-	-
4	-	2	3	-	2	-	2	-	-	-	-	2
5	2	-	3	2	-	2	2	-	-		-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B. Tech., II Semester

7G683 - PRESTRESSED CONCRETE
(PROFESSIONAL ELECTIVE –III)

L	T	P
3	1	0

Course Objective:

1. 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:

1. The students will be able to understand the basic theories and the fundamental behaviour of prestressed concrete
2. Apply the fundamental knowledge to the solution of practical problems
3. Knowledge about pre-stressing, processes and construction of pre-stressed structural components and losses.
4. Learned method of analysis of pre-stressed structural components
5. Ability to design pre-stressed components for different Civil Engineering Construction Projects

Mapping of COs & POs:

Course Outcomes	Programme outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	-	2	-	1	2	-	1	1	1	1	1
2	1	1	-	-	-	-	-	-	1	-	-	-
3	1	1	-	-	-	1	-	-	-	1	-	-
4	-	2	-	-	-	-	1	-	-	1	-	-
5	-	2	-	-	-	1	-	-	-	1	-	1

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

IV Year B. Tech. II Semester

(7G684) ADVANCED RCC DESIGN
(PROFESSIONAL ELECTIVE –IV)

L	T	P
3	1	0

Course Objective:

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

Unit I

- Design of slab less tread – riser stair case.
- Design of Longitudinal staircase

Unit II

- Design of a flat slab (Interior panel only)
- Design of grid floor

Unit III

- Design of component parts -Intz water tank excluding staging
- Design of circular and rectangular water tank resting on the ground.

Unit IV

- Design of concrete bunkers of circular shape – (excluding staging) – Introduction to silos

Unit V

- Design of cantilever and counter forte retaining wall with horizontal back fill

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:

1. Design, detail and analyze the dog legged and longitudinal stair
2. Design & detail the flat slab & grid floor.
3. Design, detail and analyze the various types of water tanks.
4. Design, detail and analyze the concrete bunkers.
5. Design, detail and analyze the cantilever & counterfort retaining walls.

Mapping of COs & POs:

Course Outcomes	Program outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1	-	-	-	-	3	-	-	-	3	-	1
2	-	3	3	3	-	3	-	2	1	3	-	1
3	-	3	3	3	-	3	-	2	1	3	-	1
4	-	3	3	3	-	3	-	-	1	3	-	1
5	-	-	-	-	-	3	-	-	-	3	-	1

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B. Tech. II Semester

**7G685 - CONSTRUCTION PLANNING & PROJECT MANAGEMENT
(PROFESSIONAL ELECTIVE – IV)**

L	T	P
3	1	0

Course Objectives:

1. The course aims at knowing all the building components, finishing works, resource and project management in an organisation with CPM and PERT as tools.

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, 4th Edition, Lakshmi Publications(P). Ltd., New Delhi, 2010.
3. Jha, Construction Project Management, 1st Edition, 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:

1. Students will able to learn about different type of building components and regulations.
2. Students would have a basic knowledge about the planning of the residential as well as public building and finishing
3. Student will be able to solve problems related to resource management including Manpower, materials, and machinery resources.
4. Student will be able to solve problems related to bar charts, Critical Path Method and Program Evaluation and Review Technique networking.
5. The students will able to prepare network elements and developments of network diagrams

Mapping of COs & POs:

Course Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	2	-	-	-	3	2	3	-	1	-	2
2	-	-	-	-	2	3	-	2	-	-	-	2
3	2	1	1	-	-	-	-	-	-	-	2	-
4	-	-	-	2	3	3	-	2	-	3	-	2
5	-	-	-	2	3	3	-	2	-	3	-	2

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B. Tech. II Semester

**7G686 - RAILWAYS, DOCKS AND HARBOUR ENGINEERING
(PROFESSIONALELECTIVE –III)**

L	T	P
3	1	0

Course Objectives:

1. To know about the Planning using modern techniques such as GIS, GPS and remote sensing design, construction and maintenance of railway tracks.
2. To have knowledge in Airport planning and design with the prime focus on runway and taxiway geometrics.
3. To conversant with the definition, purpose, location and materials of coastal structures such as piers, breakwaters, wharves, jetties, quays and spring fenders.
4. 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 – Scrled Cylinder Jetties – Scrled 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 Publising 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 Outcomes:

The students should be able to

1. Understand the Planning using modern techniques such as GIS, GPS and remote sensing design, construction and maintenance of railway tracks.
2. Understand the knowledge in Airport planning and design with the prime focus on runway and taxiway geometrics.
3. Understand the definition, purpose, location and the history about harbors, to know the historical development of ports.
4. Understand the materials of coastal structures such as piers, breakwaters, wharves, jetties, quays and spring fenders.
5. Understand the acquire knowledge on site investigation for location and planning of harbors, dredging and maintenance.

Mapping of COs & POs:

Course Outcomes	Program outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	2	-	3	-	3	-	-	-	-	-	-	3
2	2	-	2	-	-	2	-	-	-	-	-	3
3	1	-	1	-	2	-	3	-	-	-	-	2
4	2	-	3	-	-	-	3	-	-	-	-	2
5	3	-	2	-	-	2	3	-	-	-	-	2

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IV Year B. Tech. II Semester

7G687- ELEMENTS OF EARTHQUAKE RESISTANT DESIGN
(PROFESSIONALELECTIVE – V)

L	T	P
3	1	0

Course objective:

1. 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.
4. **IS Codes:** IS: 1893, IS: 4326 and IS: 13920.

Course outcomes:

1. Understand why earthquakes occur, how they are measured and categorized and the effect they may have on engineering structures
2. Apply seismic coefficient and response spectrum methods for analysis of multi storied buildings
3. Apply concepts of ductility in the design of multi-storied structures
4. Understanding the seismic effects on geometry, mass and stiffness of buildings
5. Analyze, design and detailing of shear wall based on latest earthquake code

Mapping of COs & POs:

Course Outcomes	Program outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	-	-	2	-	2	2	-	-	1	-	2
2	-	2	1	-	-	1	-	2	-	3	-	-
3	-	3	3	-	-	-	-	-	-	-	-	-
4	2	-	-	2	-	-	3	-	-	2	-	1
5	-	3	3	-	-	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B. Tech., II Semester

7G688 - GROUND WATER DEVELOPMENT AND MANAGEMENT
(PROFESSIONALELECTIVE –V)

L	T	P
3	1	0

Course Objective:

1. 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 Syatem Planning & Managemnet – R.Willes & W.W.G.Yeh, Prentice Hall.
3. Applied Hydrogeology by C.W.Fetta, CBS Publishers & Distributers.

Course Outcomes:

1. The students would demonstrate the capability to establish correlation between the various hydrological parameters.
2. The students would have the knowledge of measurements of various parameters and its importance in water resource management.
3. The students would be able to apply various statistical methods in hydrological data analysis.
4. The students would have the knowledge of importance of groundwater recharging and its techniques.
5. The students would have the knowledge of saline water intrusion in aquifer ground water basin management

Mapping of COs & POs:

	Program outcomes											
Course Outcomes	1	2	3	4	5	6	7	8	9	10	11	12
1	2	2	-	1	-	2	3	-	-	1	-	2
2	2	2	1	-	1	-	1	-	-	-	1	2
3	3	1	1	2	-	1	-	-	2	-	-	2
4	-	-	2	2	3	1	3	-	1	2	-	2
5	-	-	1	3	2	2	3	-	-	1	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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IV Year B. Tech. II Semester

7G689- REMOTE SENSING AND GIS APPLICATIONS

(PROFESSIONAL ELECTIVE –V)

L	T	P
3	1	0

Course Objective

1. To possess knowledge of Remote Sensing techniques and its application in natural resource management and Civil Engineering.

Unit I

Introduction to Photogrammetry: Principle and types of aerial photographs, stereoscopy, Map Vs Mosaic, ground control, Parallax measurements for height, determinations.

Unit II

Remote Sensing – I: Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units.

Remote Sensing – II: Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

Unit III

Geographic Information System: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

Types of data representation: Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

Unit IV

GIS Spatial Analysis: Computational Analysis Methods(CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

Unit V

Water Resources Applications-I: Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics. Water Resources Applications – II: Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage

Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

TEXT BOOKS:

1. Thomas. M. Lillesand and Ralph. W. Kiefer, Remote Sensing and Image Interpretation, John Wiley and Sons, 2003.
2. Bhatta. B (2008), Remote Sensing and GIS, Oxford University Press
3. Principals of Geo physical Information Systems – Peter ABurragh and RachaelMc Donnell, Oxford Publishers 2004.

REFERENCES:

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
2. Remote Sensing and Geographical Information systems by M.Anji Reddy JNTU KAKINADA 2001, B.S.Publications.
3. GIS by Kang – tsungchang, TMH Publications & Co.,
4. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.

Course Outcomes:

Students will know about

1. The principles and components of photogrammetric and remote sensing.
2. Procedure of data acquisition of satellite images and their characteristics.
3. Raster and vector data and modeling of GIS.
4. GIS methods and data storage related to the topography of earth surface.
5. GIS application in water resources.

Mapping of COs & POs:

Course Outcomes	Programe Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1	1	-	1	-	-	-	2	1	-	1	-
2	2	-	1	1	2	-	-	1	1	2	1	1
3	-	2	-	1	-	-	-	1	1	-	1	1
4	-	-	-		-	-	-	1	1	1	1	-
5	3	-	-	1	-	-	-	1	1	2	1	1