

**RAJEEV GANDHI MEMORIAL  
COLLEGE OF ENGINEERING AND TECHNOLOGY**  
AUTONOMOUS  
NANDYAL-518501, KURNOOL DIST., A.P., INDIA

# ***CIVIL ENGINEERING***



**ESTD: 1995**

Applicable for students admitted into B.Tech (Regular) from 2010-11  
&  
B.Tech (Lateral Entry Scheme) from 2011-12

**ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED  
SYLLABUS**

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**RAJEEV GANDHI MEMORIAL COLLEGE OF ENGG. & TECH., NANDYAL-518 501**


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**AUTONOMOUS****CIVIL ENGINEERING****NANDYAL-518501, KURNOOL DIST., A.P., INDIA**

(Affiliated to J.N.T.U.A, Anantapur)

**ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABUS****B.Tech (Regular) from 2010-11 and B.Tech (Lateral Entry Scheme) from 2011-12**

For pursuing four year under graduate Bachelor Degree Programme of study in Engineering (B.Tech), Two year Master (post graduate) Degree of study in Engineering (M.Tech), Two year Master (post graduate) degree of study in Business Administration (MBA), Three year Master (post graduate) Degree of study in Computer Applications (MCA) offered by Rajeev Gandhi Memorial College of Engineering and Technology, Nandyal - 518501 under Autonomous status and herein referred to as RGM CET(Autonomous):

All the rules specified herein approved by the Academic Council will be in force and applicable to students admitted from the Academic Year 2010-11 onwards. Any reference to “Institute” or “College” in these rules and regulations stands for Rajeev Gandhi Memorial College of Engineering and Technology (Autonomous).

All the rules and regulations, specified here after shall be read as a whole for the purpose of interpretation as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, the Principal, Rajeev Gandhi Memorial College of Engineering and Technology shall be the Chairman, Academic Council.

The candidate seeking admission into the first year of study of four year B.Tech degree Programme should have

- i) Passed either Intermediate Public Examination (IPE) conducted by the Board of Intermediate Education, Andhra Pradesh with Mathematics, Physics and Chemistry as optional subjects (or any equivalent examination certified by Board of Intermediate Examinations) or a Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Andhra Pradesh (or any equivalent certified by State Board of Technical Education) for admission.
- ii) Secured a rank in the EAMCET examination conducted by A.P. State Council for Higher Education (APSCHE) for allotment of a seat by the Convener, EAMCET, for admission.

***Admission Procedure:***

As per the norms of A.P. State Council of Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made to the first year of Four year B.Tech. Degree programme as follows:-

- a) As per the norms of Government of Andhra Pradesh, A-Category (based on the rank obtained in EAMCET) seats will be filled by the Convener, EAMCET.
- b) As per the norms of Government of Andhra Pradesh, B-Category seats will be filled by the management.

**Admission to the Second year of Four year B.Tech Degree Programme in Engineering:**

- i) Candidates qualified in ECET and admitted by the Convener, ECET, in such cases for admission, when needed permission from the statutory bodies are to be obtained.
- ii) 10% of the sanctioned strength in each programme of study (of RGM CET) shall be filled by the Convener, ECET as lateral entry.

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## AUTONOMOUS CIVIL ENGINEERING

### List of Programmes offered

- 1) B.Tech – Regular ( & Lateral Entry)
- 2) M.Tech – Regular
- 3) MBA – Regular
- 4) MCA – Regular

### 1. Academic Regulations for 2010 B.Tech (Regular)

(Effective for the students admitted into the I year from the Academic Year 2010-2011)

The B.Tech Degree will be conferred by the Jawaharlal Nehru Technological University, Anantapur, to students who are admitted to the program and fulfil all the requirements for the award of the Degree as specified below.

#### **1.0 Award of B.Tech. Degree**

The student will be declared eligible for the award of the B. Tech. degree if he fulfils the following academic regulations:

- 1.1) Pursued a course of study for not less than prescribed course work duration and not more than double the prescribed course work duration.
- 1.2) Registered for 240 credits and secured 232 credits with compulsory subjects as listed in Table-1 below.

**Table 1: Compulsory Subjects**

S.No	Subject Particulars
1.	All the first year subjects
2.	All practical subjects
3.	All audit courses/soft skills/open electives
4.	Mini project
5.	Seminar
6	Comprehensive viva voce
7.	Project work

#### **2.0 Forfeit of seat**

Students, who fail to fulfil all the academic requirements for the award of the degree within **eight academic years** from the year of their admission, shall forfeit their seat in B.Tech course.

#### **3.0 Courses of study**

The following courses of study are offered at present as specializations for the B.Tech. Course

1. Civil Engineering.
2. Computer Science and Engineering.
3. Electrical and Electronics Engineering.
4. Electronics and Communication Engineering.
5. Electronics and Instrumentation Engineering.
6. Information Technology.
7. Mechanical Engineering.

and any other course as approved by the authorities of the University from time to time.

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Table 2: Credits

	I Year				Semester			
	Periods /Week	Credits	Internal Marks	External Marks	Periods /Week	Credits	Internal Marks	External Marks
Theory	02	04	30	70	04	04	30	70
	03	05	30	70				
	03+1 *	05						
	03+1 *	06						
Practical	03	03	25	50	03	02	25	50
Practical / Drawing	03+1 *	02			06	04		
	06	06	30	70			30	70
Open Electives/Audit courses /Soft skills courses	03					02**	100	
Mini Project						02		50
Seminar						02	50	
Comprehensive Viva-voce						04		50
Project	-	-				12	50	100

[\*Tutorial,

**\*\*Open Electives/Audit courses/Soft skills course credits will not be considered for the award of division. However all these courses have to be cleared through Internal evaluation by scoring minimum of 40%.The credits obtained in these courses will be taken in to account for award of degree.]**

### 4.0 Distribution and Weightage of Marks

- 4.1 The performance of the student in each semester / I year shall be evaluated subject – wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition, mini-project, comprehensive viva, seminar shall be evaluated for 50 marks each and the project work shall be evaluated for 150 marks.
- 4.2 For theory subjects the distribution shall be 30 marks for Internal Evaluation (25 marks for internal test and 05 marks for assignments) and 70 marks for the End-Examination.
- 4.3 For the semester system, during the semester there shall be 2 tests for theory subjects. In each Internal test there shall be one compulsory (short answers) question and 3 descriptive questions. The duration of internal test will be for 2 hrs. First test to be conducted in 1 – 3 units and second test to be conducted in 4 - 6 units of each subject. For awarding of 25 Internal marks the performance of the student in two Internal examinations conducted one in the middle of the semester and the other towards the end of the semester giving a weightage of 0.75 for the better score and 0.25 for the other score will be considered.

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There shall be two assignments (problem based) in each semester for award of 05 marks so that Internal component (marks) will be 30 marks (25 marks for Internal test+05 marks for assignments).

- 4.4 For the I year class which shall be on yearly basis, there shall be 3 tests. For awarding of 25 Internal marks the performance of the student in three Internal examinations conducted as per the schedule giving a weightage of 0.5 for the best score, 0.25 for better score and 0.25 for the other score will be considered. The distribution of syllabus for the conduct of Internal tests in the first year shall be as follows:

**Table 3: Units for Internal Tests**

I Year		Semester
2 Units	First Internal test.	3 Units First Internal test.
3 Units	Second Internal test.	3 Units Second Internal test.
3 Units	Third Internal test.	

In a year there shall be at least three assignments and in each semester there shall be two assignments for the award of 5 marks.

- 4.5 In the case of open electives/Audit courses and soft skills subjects two Internal examinations shall be conducted one in the middle of the semester and the other at end of the semester for 70 marks and the marks scored by the student in these exams with a weightage of 0.75 for better score and 0.25 for the other score will be awarded as Internal marks for 70. The remaining 30 marks are based on the average marks scored in two assignments.
- 4.6 No makeup test for Internal examination or assignments will be conducted in any subject or practical. The student, who is absent for any test shall be deemed to have scored zero in that test.

#### 5.0 Question Paper Pattern:

- 5.1 Each Internal Test question paper shall contain 5 questions, of which the First question is compulsory and three questions are to be answered from the remaining four. Compulsory question carries 10 marks (It contains 5 questions of two marks - no choice in first question). The remaining 3 questions carry 5 marks each.
- 5.2 The End Examination question paper will have 7 questions and students have to write 5 questions. However, the first question is compulsory and it consists of 7 short answer questions, each carrying 2 marks. The next 4 questions are to be answered from the remaining 6 questions and each carries 14 marks.
- 5.3 For practical subjects there shall be a continuous evaluation during the semester for 25 Internal marks and 50 End Examination marks. Of the 25 marks for Internal, 20 marks shall be awarded for day-to-day work and 5 marks to be awarded by conducting an Internal laboratory test. The End Examination shall be conducted by the teacher concerned and an external Examiner from other institutions.
- 5.4 For the subject having design and / or drawing, (such as Engineering Graphics, Machine Drawing etc ) and estimation, the distribution shall be 30 marks for Internal evaluation (15 marks for day-to-day work and 5 marks for Internal tests and 10 marks for assignments) and 70 marks for End Examination. There shall be two Internal tests in a Semester and the best of the two shall be considered for the award

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of marks for Internal tests. However in the I year class, there shall be three Internal tests and the average of best two will be taken into consideration for award of Internal marks.

- 5.5 The Engineering Drawing Practice Lab, wherever offered is to be treated as a theory subject. Evaluation method adopted for theory subjects shall be followed here as well.
- 5.6 There shall be mini-Project, in collaboration with an industry (wherever possible) of their specialization, to be taken up during the vacation(data collection, components etc) after III year II Semester examination and implementation/simulation shall be carried out in IV first semester during lab classes. Implementation or construction of mini project will be treated as laboratory. However, the mini project and its report shall be evaluated in IV year I Semester. The mini project shall be submitted in report form and should be presented before the committee, which shall be evaluated for 50 marks. The committee consists of an external Examiner, Head of the Department, the supervisor of mini project and a senior faculty member of the Department. There shall be 25 Internal marks for mini project which will be awarded based on the performance and involvement of the student during mini project period.
- 5.7 There shall be a seminar presentation in IV year II semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the Department, which shall be evaluated by the Departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member of the department. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.
- 5.8 There shall be a comprehensive viva voce examination at the end of IV year II semester for 50 marks which shall be conducted by HOD, senior faculty and external Examiner from other institute.
- 5.9 The project topic should be approved by Internal Department Committee (IDC). Out of total 150 marks for the project work, 50 marks shall be for Internal Evaluation and 100 marks for the End Semester Examination. The evaluation of project work shall be conducted at the end of the IV year II semester. The project viva voce examination will be conducted by committee consists of an external Examiner from other institute, Head of the Department and the supervisor of the project. The Internal evaluation for 50 marks shall be on the basis of two seminars given by each student on the topic of the project. The Internal evaluation of the project work for 50 marks shall be conducted by committee consists of head of the Department or his nominee, senior faculty member and the supervisor of project.

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**Table4: Distribution of weightages for examination and evaluation:**

S.No	Nature of subject	Marks	Type of examination and mode of assessment		Scheme of Examination
1	Theory	70	End Examination (External evaluation)		End Examination in theory subjects will be for 70 marks.
		30	25	Internal examinations (Internal evaluation)	These 25 marks are awarded to the students based on the performance in three(yearly) or two(semester) Internal examinations with a weightage of 0.5 for best score, 0.25 for better score, 0.25 for other score (yearly) and 0.75 for better score and 0.25 for the other score(semester) respectively.
			05	Assignments (Internal evaluation)	Average of two assignments each of 05 marks
2	practical	50	End lab examination (External evaluation)		This End Examination in practical subjects will be for a maximum of 50 marks.
		25	20	Internal evaluation	Day-to-day performance in lab experiments and record
			05	Internal evaluation	Internal lab examination at the end of year/semester
3	Mini Project	50	End Examination (External evaluation)		This End Examination in miniproject will be for a maximum of 50 marks.
		25	Internal evaluation		Day-to-day performance in executing mini project.
4	Seminar	50	Internal evaluation		Based on the performance in two seminars during semester
5	Comprehensive Viva	50	External evaluation		This end viva voce examinations in all the subjects for 50 marks
6	Project work	100	External evaluation		This end viva voce in project work for 100 marks
		50	Internal evaluation		These 50 marks are awarded based on the performance of the student which includes attendance and regularity
7	Open electives/ Audit courses/ softskills	70	Internal evaluation		These 70 marks are awarded to the students based on the performance of two Internal examinations with a weightage of 0.75 for better score and 0.25 for the other score
		30	Internal evaluation		Based on the two assignments

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### 6.0 Attendance Requirements:

- 6.1 The student shall be eligible to appear for End Examinations of the semester/ year if he acquires a minimum of 75% of attendance in aggregate of all the subjects of that semester/year.
- 6.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in a semester / year may be granted by the College Academic Committee.
- 6.3 The student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester / year, as applicable. They may seek re-admission for that semester / year when offered next.
- 6.4 **Shortage of Attendance below 65% in aggregate shall in NO case be condoned.**
- 6.5 Students whose shortage of attendance is not condoned in any semester / year are not eligible to take their End Examination of that class and their registration shall stand cancelled.
- 6.6 The stipulated fee shall be payable towards Condonation of shortage of attendance.

### 7.0 Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.6

- 7.1 The student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical or design or drawing subject or project if he secures not less than 35% of marks in the End Examination and he has to score minimum of 40% marks from Internal and external exam marks put together to clear the subject.
- 7.2 The student shall be promoted from II to III year only if he fulfils the academic requirement of securing 40 out of 80 credits from one regular and one supplementary examinations of I year, and one regular examinations of II year I semester irrespective of whether the candidate takes the examination or not.
- 7.3 The student shall be promoted from third year to fourth year only if he fulfils the academic requirements of securing total 72 out of 144 credits from the following examinations, whether the candidate takes the examinations or not.
  - a) Two regular and two supplementary examinations of I year.
  - b) Two regular and one supplementary examinations of II year I semester.
  - c) One regular and one supplementary examinations of II year II semester.
  - d) One regular examination of III year I semester.
- 7.4 The student shall register and put up minimum attendance in all 240 credits and earn the 232 credits. Marks obtained in the best 220 credits (excluding the credits obtained in audit courses/soft skills and open electives) shall be considered for the calculation of percentage of marks.
- 7.5 Students who fail to earn 232 credits as indicated in the course structure including compulsory subjects as indicated in Table-1 within eight academic years from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.

**Table 5: Promotion rules**

Promotion from	Total credits to register	Total credits to be earned for promotion
II year to III year	80	40
III year to IV year	144	72



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### 8.0 Course pattern:

- 8.1 The entire course of study is of four academic years. The first year shall be on yearly pattern and the second, third and fourth years shall be on semester pattern.
- 8.2 The student is eligible to appear for the End Examination in a subject, but absent at it or has failed in the End Examination may appear for that subject at the supplementary examination.

**Table: 6 Course pattern**

Year	Semester	No. of Subjects	No. of Audit subjects	Number of Labs	Total credits	
First year		O7 {ENG-4,EP-5,EC-5,M1-5, MM/EM-5,CDS-6,ED-6}	00	04	1X4=04 4X5=20 2X6=12 4X3=12	48
Second year	First	06	01	03	6X4=24 1X2=02 3x2=06	32
	Second	06	01	03	6X4=24 1X2=02 3x2=06	32
Third year	First	06	01	03	6X4=24 1X2=02 3x2=06	32
	Second	06	01	03	6X4=24 1X2=02 3x2=06	32
Fourth year	First	06	01	02 Mini project	6X4=24 1X2=02 3x2=06	32
	Second	03	01	Seminar Comprehensive Viva Project Viva	3x4 =12 1X2=02 1X2=02 1X4=04 1X12=12	32
<b>GRAND TOTAL</b>						<b>240</b>

### 9.0 Award of Class:

After the student has satisfied the requirements prescribed for the completion of the programme and is eligible for the award of B.Tech. Degree he shall be placed in one of the following four classes:

**Table 7: Award of Division**

Class Awarded	% of marks to be secured	From the aggregate marks secured for the best 220 Credits excluding audit courses/ open elective/soft skills credits.
First Class with Distinction	70% and above	
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

(The marks in Internal evaluation and End Examination shall be shown separately in the marks memorandum)

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**10.0 Supplementary Examinations:**

Apart from the regular End Examinations the institute may also schedule and conduct supplementary examinations for all subjects for the benefit of students with backlogs. Such students writing supplementary examinations as supplementary candidates may have to write more than one examination per day.

**11.0 Transcripts:**

After successful completion of prerequisite credits for the award of degree a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee and also as per norms in vogue.

**12.0 Rules of Discipline:**

- 12.2 Any attempt by any student to influence the teachers, Examiners, faculty and staff of controller of Examination for undue favours in the exams, and bribing them either for marks or attendance will be treated as malpractice cases and the student can be debarred from the college.
- 12.3 When the student absents himself, he is treated as to have appeared and obtained zero marks in that subject(s) and grading is done accordingly.
- 12.4 When the performance of the student in any subject(s) is cancelled as a punishment for indiscipline, he is awarded zero marks in that subject(s).
- 12.4.1 When the student's answer book is confiscated for any kind of attempted or suspected malpractice the decision of the Examiner is final.

**13.0 Minimum Instruction Days:**

The minimum instruction days for each semester / I year shall be 95/180 clear instruction days excluding the days allotted for tests/examinations and preparation holidays declared if any.

**14.0 Amendment of Regulations:**

The college may, from time to time, revise, amend or change the regulations, scheme of examinations and syllabi. However the academic regulations of any student will be same throughout the course of study in which the student has been admitted.

**15.0 Transfers**

There shall be no branch transfers after the completion of admission process.

**16.0 General:**

- 16.2 The Academic Regulation should be read as a whole for the purpose of any interpretation.
- 16.3 In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.
- 16.4 The Institute may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Institute.
- 16.5 Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

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### ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME)

(Effective for the students getting admitted into II year from the Academic Year 2011-2012 on wards)

- 1.0 The Students have to acquire 184 credits out of 192 from II to IV year of B.Tech. Program (Regular) for the award of the degree.
- 2.0 Students, who fail to fulfil the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.
- 3.0 The same attendance regulations are to be adopted as that of B.Tech. (Regular).

#### 4.0 Promotion Rule:

The student shall be promoted from third year to fourth year only if he fulfils the academic requirements of 48 out of 96 credits from the examinations.

- a) Two regular and one supplementary examinations of II year I semester.
- b) One regular and one supplementary examinations of II year II semester.
- c) One regular examination of III year I semester.

#### 5.0 Award of Class:

After the student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B.Tech. Degree he shall be placed in one of the following four classes: The marks obtained in the best 172 credits will be considered for the calculation of percentage and award of class.

**Table 1: Award of Division**

Class Awarded	% of marks to be secured	From the aggregate marks secured for best 172 Credits. (i.e. II year to IV year) excluding audit/open electives/soft skills
First Class with Distinction	70% and above	
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

(The marks in Internal evaluation and End Examination shall be shown separately in the marks memorandum)

- 6.0 **All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B.Tech. (Lateral Entry Scheme)**

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**CIVIL ENGINEERING****COURSE STRUCTURE**

(Common to Branches: ECE, EEE, EIE, CSE &amp; IT)

**I B.Tech**

Code	Subject	Scheme of instruction periods/week		Credits	Scheme of Examination		
		Theory	Practical		Internal Marks	External Marks	Total Marks
Theory							
A0001101	English	3+1*	-	4	30	70	100
A0002101	Engineering Physics	3+1*	-	5	30	70	100
A0003101	Engineering Chemistry	3+1*	-	5	30	70	100
A0004101	Mathematics – I	3+1*	-	5	30	70	100
A0302101	Engineering Mechanics	3+1*	-	5	30	70	100
A0501101	C Programming and Data Structures	3+1*	-	6	30	70	100
A0301101	Engineering Drawing	3+1*	-	6	30	70	100
Practical							
A0591101	C Programming and Data Structures Lab	-	3	3	25	50	75
A0391101	Engineering and IT Workshop	-	3	3	25	50	75
A0091101	Engineering Physics Lab and Engineering Chemistry Lab	-	3	3	25	50	75
A0092101	English Language Communication Skills Lab	-	3	3	25	50	75
Total		28	12	48	310	690	1000

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## CIVIL ENGINEERING COURSE STRUCTURE II B.TECH, I-SEMESTER

Subject Code	Subject	Hours/ Week			Credits	Marks		
		Theory	Tutorial	Lab		Internal	External	Total
A0006103	Mathematics – II	3	1	-	4	30	70	100
A0201103	Electrical & Electronics Engineering	3	1	-	4	30	70	100
A0101103	Strength of Materials – I	3	1	-	4	30	70	100
A0102103	Surveying	3	1	-	4	30	70	100
A0103103	Fluid Mechanics	2	4*	-	4	30	70	100
A0104103	Building Materials and Construction	3	1	-	4	30	70	100
A0007103	Aptitude Arithmetic Reasoning & Comprehension	3	-	-	2	30	70 (Internal Evaluation)	100
A0191103	Surveying Lab – I	-	-	3	2	25	50	75
A0192103	Strength of Materials Lab	-	-	3	2	25	50	75
A0291103	Electrical & Electronics Engineering Lab	-	-	3	2	25	50	75
	<b>Contact Periods / Week</b>	<b>20</b>	<b>4*+5</b>	<b>9</b>	<b>32</b>	<b>285</b>	<b>640</b>	<b>925</b>

## II B.TECH, II-SEMESTER

Subject Code	Subject	Hours/ Week			Credits	Marks		
		Theory	Tutorial	Lab		Internal	External	Total
A0011103	Probability and Statistics	3	1	-	4	30	70	100
A0010103	Environmental Studies	3	1	-	4	30	70	100
A0105104	Strength of Materials – II	3	1	-	4	30	70	100
A0106104	Hydraulics and Hydraulic Machinery	3	1	-	4	30	70	100
A0107104	Structural Analysis – I	3	1	-	4	30	70	100
A0108104	Building Planning and Drawing	3	1*	-	4	30	70	100
A0009103	Corporate Management Skills	3	-	-	2	30	70 (Internal Evaluation)	100
A0193104	Fluid Mechanics and Hydraulic Machinery Lab	-	-	3	2	25	50	75
A0194104	Surveying Lab - II	-	-	3	2	25	50	75
A0195104	Construction Materials Testing Lab	-	-	3	2	25	50	75
	<b>Contact Periods / Week</b>	<b>21</b>	<b>6</b>	<b>9</b>	<b>32</b>	<b>285</b>	<b>640</b>	<b>925</b>

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## CIVIL ENGINEERING

### COURSE STRUCTURE III B.TECH, I-SEMESTER

Subject Code	Subject	Hours/ Week			Credits	Marks		
		Theory	Tutorial	Lab		Internal	External	Total
A0013105	Managerial Economics and Financial accounting	3	1	-	4	30	70	100
A0109105	Design Of Reinforced Concrete Structures	3	1	-	4	30	70	100
A0110105	Water Supply & Treatment	3	1	-	4	30	70	100
A0111105	Water Resources Engineering -I	3	1	-	4	30	70	100
A0112105	Structural Analysis - II	3	1	-	4	30	70	100
A0113105	Engineering Geology	3	1	-	4	30	70	100
A0114105	Construction Technology & Project Management	3	-		2	30	70 (Internal Evaluation)	100
A0093105	Professional Communication and Soft Skills Lab	-	-	3	2	25	50	75
A0196105	Engineering Geology Lab	-	-	3	2	25	50	75
A0197105	Civil Engineering Drawings using AutoCAD Lab	-	-	3	2	25	50	75
	<b>Contact Periods / Week</b>	<b>21</b>	<b>6</b>	<b>9</b>	<b>32</b>	<b>285</b>	<b>640</b>	<b>925</b>

### III B.TECH, II-SEMESTER

Subject Code	Subject	Hours/ Week			Credits	Marks		
		Theory	Tutorial	Lab		Internal	External	Total
A0012105	Management Science	3	1	-	4	30	70	100
A0115106	Geotechnical Engineering -I	3	1	-	4	30	70	100
A0116106	Waste Water Engineering	3	1	-	4	30	70	100
A0117106	Design of Steel Structures	3	1	-	4	30	70	100
A0118106	Water Resources Engineering-II	3	1	-	4	30	70	100
A0119106	Highway Engineering	3	1	-	4	30	70	100
A0120106	Prestressed concrete	3	-	-	2	30	70 (Internal Evaluation)	100
A0198106	Geotechnical Engineering Lab	-	-	3	2	25	50	75
A0199106	Environmental Engineering Lab	-	-	3	2	25	50	75
A0181106	CAD Lab	-	-	3	2	25	50	75
	<b>Contact Periods / Week</b>	<b>21</b>	<b>6</b>	<b>9</b>	<b>32</b>	<b>285</b>	<b>640</b>	<b>925</b>

# RAJEEV GANDHI MEMORIAL COLLEGE OF ENGG. & TECH., NANDYAL-518 501

AUTONOMOUS

## CIVIL ENGINEERING

### COURSE STRUCTURE IV B.TECH, I-SEMESTER

Subject Code	Subject	Hours/ Week			Credits	Marks		
		Theory	Tutorial	Lab		Internal	External	Total
A0121107	Geotechnical Engineering-II	3	1	-	4	30	70	100
A0122107	Estimation, Costing & Valuation	3	1	-	4	30	70	100
A0123107	Advanced Structural Design	3	1	-	4	30	70	100
A0124107	Finite Element Methods in Civil engineering	3	1	-	4	30	70	100
	Elective - I	3	1	-	4	30	70	100
	Elective - II	3	1	-	4	30	70	100
A0135107	Environmental Impact Assessment & Management	3	-		2	30	70 (Internal Evaluation)	100
A0182107	GIS Lab	-	-	3	2	25	50	75
A0183107	Highway Engineering Lab	-	-	3	2	25	50	75
A0184107	Industry Oriented Mini Project ( Design Project)	-	-	3	2	25	50	75
	<b>Contact Periods / Week</b>	<b>21</b>	<b>6</b>	<b>9</b>	<b>32</b>	<b>285</b>	<b>640</b>	<b>925</b>

### IV B.TECH, II-SEMESTER

Subject Code	Subject	Hours/ Week			Credits	Marks		
		Theory	Tutorial	Lab		Internal	External	Total
A0136108	Design and Drawing of Irrigation Structures	3	1	-	4	30	70	100
	Elective - III	3	1	-	4	30	70	100
	Elective - IV	3	1	-	4	30	70	100
A0148108	Maintenance & Repair of Buildings	3	-	-	2	30	70 (Internal Evaluation)	100
A0185108	Project Work	-	-	-	12	50	100	150
A0186108	Seminar	-	-	-	2	50	-	50
A0187108	Comprehensive Viva-Voce	-	-	-	4	-	50	50
	<b>Contact Periods / Week</b>	<b>12</b>	<b>3</b>	<b>-</b>	<b>32</b>	<b>220</b>	<b>430</b>	<b>650</b>

**CIVIL ENGINEERING****ELECTIVES****Elective-I Code**

1. A0125107
2. A0126107
3. A0127107
4. A0128107
5. A0129107

**Elective-I**

- Geoinformatics
- Water Resources System Planning and Management
- Earthquake Resistant Design
- Bridge Engineering
- Open Channel Hydraulics

**Elective-II Code**

1. A0130107
2. A0131107
3. A0132107
4. A0133107
5. A0134107

**Elective-II**

- Railways, Docks & Harbour Engineering
- Traffic Engineering
- Safety Engineering
- Ground Improvement Techniques
- Airport Engineering

**Elective-III Code**

1. A0137108
2. A0138108
3. A0139108
4. A0140108
5. A0141108

**Elective-III**

- Advanced Foundation Engineering
- Soil Dynamics and Machine Foundations
- Advanced Structural Analysis
- Experimental Stress Analysis
- Fire Safety Engineering Design of Structures

**Elective-IV**

1. A0142108
2. A0143108
3. A0144108
4. A0145108
5. A0146108
6. A0147108

- Industrial Waste and Waste Water Management
- Pavement Analysis and Design
- Pipeline Engineering
- Ground Water Development and Management
- Water Shed Management
- Concrete Technology



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**RAJEEV GANDHI MEMORIAL COLLEGE OF ENGG. & TECH., NANDYAL-518 501**


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**AUTONOMOUS****CIVIL ENGINEERING****I B.TECH. (REGULAR, 2010-11)**

(Common to all Branches)

For Branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E.

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**(A0001101) ENGLISH****1. INTRODUCTION :**

The sweeping changes in the world have elevated English to the status of a tool of global communication and transformed it into e-English. The syllabus has been drafted to improve the competence of students in communication in general and language skills in particular. The books prescribed serve as students' handbooks.

The teacher should focus on the skills of reading, writing, listening and speaking while using the prescribed text and exercises. The classes should be interactive. The students should be encouraged to participate in the classroom proceedings and also to write short paragraphs and essays. The main aim is to encourage two way communications in place of the one-sided lecture.

The text for non-detailed study is meant for extensive reading by the students. They may be encouraged to read some select topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements etc.

**2. OBJECTIVES:**

- To improve the language proficiency of the students in English with an emphasis on LSRW skills.
- To equip the students to study academic subjects with greater facility through theoretical and practical components of the syllabus.
- To develop study skills as well as communication skills in formal and informal situations.

**3. SYLLABUS:****Listening Skills:****Objectives**

- To enable students to develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.
- To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and dialects.

Students should be given practice in listening and identifying the sounds of English language and to mark stress, right intonation in connected speech.

- Listening for general content.
- Intensive listening.
- Listening to fill up information.
- Listening for specific information .

**Speaking Skills:****Objectives**

- To make students aware of the role of ability to speak fluent English and its contribution to their success.
- To enable students to express themselves fluently and appropriately in social and professional contexts.
  - Oral practice
    - Describing objects/situations/people
  - Role play – Individual/Group activities
    - Just A Minute (JAM) Sessions.

(Using exercises from all units of the prescribed text)

AUTONOMOUS  
**CIVIL ENGINEERING**

**Reading Skills:****Objectives**

1. To develop an awareness in the students about the significance of silent reading and comprehension.
  2. To develop the ability to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.
- Skimming the text
  - Identifying the topic sentence
  - Understanding discourse features
  - Understanding the gist of an argument
  - Inferring lexical and contextual meaning
  - Recognizing coherence/sequencing of sentences

The students shall be trained in reading skills using the prescribed text for detailed study. They shall be examined in reading and answering questions using 'unseen' passages which may be taken from the non-detailed text or other authentic texts, such as magazines/newspaper articles.

**Writing Skills:****Objectives**

1. To develop an awareness in the students the skill to write exact and formal writing.
  2. To equip them with the components of different forms of writing.
- Writing sentences
  - Paragraph writing
  - Narration / description
  - Formal and informal letter writing
  - Use of appropriate vocabulary
  - Coherence and cohesiveness
  - Note Making
  - Editing a passage

**4. TEXTBOOKS PRESCRIBED:**

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content, divided into **Eight Units**, are prescribed:

**For Detailed study: ENJOYING EVERYDAY ENGLISH**, Sangam Books (India) Pvt Ltd Hyderabad, 2009

**For Non-detailed study: INSPIRING LIVES**, Maruti Publications, Guntur, 2009

**UNIT -I**

- a) Heaven's Gate from **ENJOYING EVERYDAY ENGLISH**.
- b) Mokshagundam Visvesaraya from **INSPIRING LIVES**

**UNIT -II**

- a) Sir C.V.Raman from **ENJOYING EVERYDAY ENGLISH**.
- b) Mother Teresa from **INSPIRING LIVES**.

**UNIT -III**

- a) The Connoisseur from **ENJOYING EVERYDAY ENGLISH**.
- b) Dr. Amartya Kumar Sen from **INSPIRING LIVES**.

**UNIT -IV**

- a) The Cuddalore Experience from **ENJOYING EVERYDAY ENGLISH**.
- b) Gertrude Elion from **INSPIRING LIVES**.

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**UNIT -V**

- a) Bubbling Well Road from **ENJOYING EVERYDAY ENGLISH**.
- b) Vishwanathan Anand from **INSPIRING LIVES**.

**UNIT-VI**

- a) Odds against Us from **ENJOYING EVERYDAY ENGLISH**.
- b) Charlie Chaplin from **INSPIRING LIVES**.

**UNIT – VII**

- a) Exercises on Reading and Writing Skills, Reading Comprehension, Letter writing, Report writing

**UNIT – VIII**

Exercises on Remedial Grammar covering Common errors in English, Subject-Verb agreement, Use of Articles and Prepositions, Active/Passive Voice, Reported speech, Tenses Vocabulary development covering Synonyms & Antonyms, one-word substitutes, prefixes & suffixes, Idioms & phrases, words often confused.

**Evaluation:** The question paper shall contain two parts, Part A containing questions from Units I- VI and Part B containing questions from units VII & VIII. The student is required to answer five full questions choosing at least one from Part B.

**REFERENCES:**

1. Technical Communication , Principle and Practice, Meenakshi Raman and Sangita Sharma, OUP, 2009
2. Essential Grammar in Use, (with CD) 3<sup>rd</sup> edn, Cambridge University Press, 2009.
3. Resumes and Interviews, M.Ashraf Rizvi, Tata - Mcgraw Hill, 2009.
4. Everyday Dialogues in English by Robert J. Dixon, Prentice-Hall of India Ltd., 2006.
5. Communication Skills for Technical Students, T.M.Farhathullah, Orient Blackswan, 2008.
6. Developing Communication Skills, 2<sup>nd</sup> edn. by Krishna Mohan & Meera Banerji , Macmillan, 2009.
7. English for Technical Communication, Vol. 1 & 2, by K. R. Lakshmi Narayanan, Sci tech. Publications.
8. Basic Communication Skills for Technology, Andrea J Ruthurford, Pearson Education, Asia.
9. Longman Dictionary of Contemporary English with DVD, Pearson Longman.

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**AUTONOMOUS****CIVIL ENGINEERING****I B.TECH. (REGULAR, 2010-11)**

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3+1*	5

**(A0002101) ENGINEERING PHYSICS****UNIT I**

**OPTICS:** Interference - Interference in thin films by reflection - Newton's rings - Diffraction - Fraunhofer diffraction at a single slit - Fraunhofer diffraction at a double slit - Diffraction grating - Grating spectrum - polarization - Nicol prism - Theory of circular and elliptical polarized light - Quarter and half wave plates.

**UNIT II**

**CRYSTAL STRUCTURES AND X-RAY DIFFRACTION:** Introduction - Space lattice - Basis - Unit cell - Lattice parameter - Bravais lattices - Crystal systems - Structure Simple cubic - Body Centered Cubic - Face Centered Cubic crystals - Miller indices of planes and directions in crystals - Separation between successive (h k l) planes - X-ray diffraction by crystal planes - Bragg's law - Laue and Powder methods.

**UNIT III**

**PRINCIPLES OF QUANTUM MECHANICS & ELECTRON THEORY:** Waves and Particles - de-Broglie's hypothesis - Heisenberg's uncertainty principle - Schroedinger's one dimensional wave equation (Time Independent) - Particle in a one dimensional potential box - Energy levels - Fermi-Dirac distribution and effect of Temperature (qualitative treatment only) - Scattering - Source of electrical resistance - Kronig-Penney model (qualitative treatment only) - energy bands - metals, semi conductors & insulators.

**UNIT IV**

**SEMICONDUCTORS:** Intrinsic and extrinsic semiconductors - Law of mass action - Continuity equation - Drift & diffusion - Einstein's relation - Hall effect - Direct & indirect band gap semiconductors - p-n junction - Band diagram of p-n junction diode - Diode Equation - LED, LCD & Photo diode.

**UNIT V**

**MAGNETIC PROPERTIES:** Introduction - Origin of magnetic moment - Classification of magnetic materials - Dia, Para, Ferro, anti-Ferro and Ferri magnetism - Hysteresis - Soft and hard magnetic materials - Magnetic bubbles memory.

**DIELECTRIC PROPERTIES:** Introduction - Dielectric constant - Electronic, Ionic and Orientation polarizations (qualitative treatment only) - Local field - Clausius - Mossotti equation - Frequency dependence of polarisability (qualitative treatment only) - Ferro electricity - BaTiO<sub>3</sub>.

**UNIT VI**

**SUPERCONDUCTIVITY:** General properties - Meissner effect - Penetration depth - Type I and Type II superconductors - Flux quantization - Josephson effects - BCS theory - Applications of superconductors.

**LASERS:** Introduction - Characteristics of laser - Spontaneous and stimulated emission of radiation - Einstein's coefficients - Population inversion - Ruby Laser - Helium-Neon Laser - GaAs Laser - Applications of Lasers in Industry, Scientific and Medical fields.

**UNIT VII**

**FIBER OPTICS:** Principle of optical fiber - Acceptance angle and Acceptance cone - Numerical aperture - Types of Optical fibers and refractive index profiles - Optical fiber communication systems - Application of optical fibers.

**CIVIL ENGINEERING****UNIT VIII**

**NANOMATERIALS:** Introduction - Basic principles of nano materials - Fabrication of nano materials - ball milling - plasma arching - Chemical vapour deposition method - sol-gel methods - properties of nano materials - carbon nano tubes - properties and applications of carbon nano tubes - Applications of nano materials.

**TEXT BOOKS:**

1. Engineering Physics by V. Rajendran & K.Thyagarajan, Tata McGraw-Hill Publishing Co. Ltd.
2. Engineering Physics by M.R.Srinivasan New Age Publications.
3. Engineering Physics by M.N.Avadhanulu, S.Chand Publications, New Delhi.

**REFERENCES:**

1. Physics Volume 2, by Halliday, Resnick and Krane; John Wiley India.
2. Solid State Physics by C.Kittel, Wiley India.
3. Engineering Physics by Mittal, I.K.International.
4. Introduction to Nanoscience & Nano Technology by K.K Chattopadhy A.N. Banarjee , Prentice – Hall of India Pvt. Ltd.

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**AUTONOMOUS****CIVIL ENGINEERING****I B.TECH. (REGULAR, 2010-11)**

(Common to all Branches)

For Branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E.

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3+1*	5

**(A0003101) ENGINEERING CHEMISTRY****UNIT I**

**Water:** Sources of Water, Types of impurities in Water, Hardness of Water - Temporary and Permanent hardness, Units, Estimation of hardness by EDTA Method, Analysis of Water - Dissolved Oxygen, Disadvantages of Hard Water, Problems on hardness of water, Methods of Treatment of Water for Domestic Purpose - Sterilisation: Chlorination, Ozonisation.

**Water for Industrial purpose:** Water for Steam Making, Boiler Troubles - Carry Over (Priming and Foaming), Boiler Corrosion, Scales and Sludges, Caustic Embrittlement, Water Treatment - Internal Treatment - Colloidal, Phosphate, Calgon, Carbonate, Sodium aluminates Conditioning of Water. External Treatment - Ion- Exchange Process; Demineralization of Brakish Water - Reverse Osmosis.

**UNIT II**

**Science of Corrosion:** Definition, Types of corrosion: Dry Corrosion, (Direct Chemical attack), Wet Corrosion, Theories of Corrosion and Mechanism, Electro Chemical Theory of Corrosion, Galvanic Series, Galvanic Corrosion, Concentration Cell Corrosion, Oxygen absorption type, Factors Influencing Corrosion, Control of Corrosion - Cathodic Protection - Sacrificial anode and Impressed Current, Uses of Inhibitors, Electro Plating and Electro less plating (copper and nickel).

**UNIT III**

**Polymers:** Polymerization Reactions - Basic concepts, Types of Polymerization - Addition and Condensation Polymerization, Plastics - Thermosetting and Thermoplastics, Composition, Properties and Engineering Uses of the Following: Teflon, Bakelite, Nylon, Rubber - Processing of Natural Rubber and Compounding, Elastomers - Buna S, Buna N, Polyurethane Rubber; Silicone Rubber, Conducting Polymers, Synthesis and applications of Polyacetylene and Poly aniline Liquid Crystals definition, properties, suitable examples and Engineering Applications.

**UNIT IV**

**Chemistry of nano materials:** Nano materials definition, properties and applications.

**Explosives and Propellants:** Explosives, Classification, precautions during storage, blasting fuses, important explosives, Rocket propellants, classification of propellants.

**Lubricants :** Principles and function of lubricants - Classification and properties of lubricants - Viscosity, flash and fire points, cloud and pour points, aniline point, Neutralization Number and Mechanical Strength.

**UNIT V**

**Electro Chemistry:** Conductance - Equivalent Conductance - Molecular Conductance, Conductometric Titrations - Applications of Conductivity Measurements.

**Electrochemical Cells:** Measurement of EMF, Standard electrode potential, concentration cells, batteries (Ni-Cd cell), Lithium batteries, Fuel cell: hydrogen oxygen fuel cell and methanol fuel cell

**Insulators** – Definition, Properties and Characteristics of Insulating Materials, Engineering Applications.

**UNIT VI:**

Phase rule: Definition, Terms involved in Phase Rule and Phase rule equation. Phase diagrams - one component system (water system), two component system (lead- silver system) Eutectics, heat treatment based on iron-carbon phase diagram, hardening, annealing.

**CIVIL ENGINEERING****UNIT VII:**

**Fuels and Combustion:** Definition and Classification of fuels, Solid, liquid & gaseous fuels, Characteristics of a good fuel, Metallurgical Coke - Characteristics & Manufacture (Otto-Halfmann), Petroleum - Refining - Synthetic Petrol, Calorific Value & its determination (Bomb Calorimeter - Junker's Gas Calorimeter). Combustion: Flue gas analysis by Orsat's apparatus.

**UNIT VIII:****Building Materials:**

Cement: composition of Portland cement, analysis, setting & hardening of cement (reactions).

**Refractories:** Definition, Classification With Examples; Criteria of a Good Refractory Material; Causes for the failure of a Refractory Material.

**TEXT BOOKS**

1. Chemistry for Engineers Prof. K.N.Jayaveera, Dr.G.V.Subba Reddy and Dr.C.Ramachandraiah, McGraw Hill Higher Education Hyd., 2009.
2. A text book of Engineering Chemistry by S.S. Dara, S.Chand & Co, New Delhi (2008).
3. Text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company, 15<sup>th</sup> edition New Delhi (2008).

**REFERENCE**

1. Engineering Chemistry Dr. K. B. Chandrasekhar, Dr. U.N. Dash, Dr. Sujatha Mishra, Scitech Publications (India) Pvt. Limited, Hyderabad. 2009.
2. Fuel Cells principles and applications by B.Viswanath, M.Aulice Scibioh - Universities press.
3. Chemistry of Engineering Materials by C.V. Agarwal, Tara Publication, Varanasi.2008.
4. Physical Chemistry - Glasston & Lewis.
5. Engineering Chemistry (Vol.1&2) by J C Kuriacose and J. Rajaram, Tata McGraw-Hill Co, New Delhi (2004).
6. Applied Chemistry: A Text Book for chemistry for Engineers & Technologists, G.D. Gesser, Springer, 2000

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**AUTONOMOUS****CIVIL ENGINEERING****I B.TECH. (REGULAR, 2010-11)**

(Common to all Branches)

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3+1*	5

**(A0004101) MATHEMATICS – I****UNIT I**

Differential equations of first order and first degree - Exact, linear and Bernoulli equations. Applications to Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

**UNIT II**

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

**UNIT III**

Rolle's Theorem - Lagrange's Mean Value Theorem - (excluding proof). Simple examples of Taylor's and Maclaurin's Series - Functions of several variables - Jacobian - Maxima and Minima of functions of two variables, Lagrangian method of Multipliers with three variables only.

**UNIT IV**

Radius of Curvature - Curve tracing - Cartesian, polar and parametric curves. Applications of integration to lengths, volume and surface area of solids of revolution in Cartesian and polar coordinates

**UNIT V**

Multiple integral: Double and triple integrals - Change of Variables - Change of order of integration.

**UNIT VI**

Laplace transform of standard functions - Inverse transform - First shifting Theorem, Transforms of derivatives and integrals - Unit step function - Second shifting theorem - Dirac's delta function - Convolution theorem - Laplace transform of Periodic function.

**UNIT VII**

Differentiation and integration of Laplace transform - Application of Laplace transforms to ordinary differential equations of first and second order.

**UNIT VIII**

Vector Calculus: Gradient – Divergence - Curl and Their properties; Vector integration - Line integral - Potential function - Area, Surface and volume integrals, Vector integral theorems: Green's theorem - Stoke's and Gauss's Divergence Theorem (excluding their proof), Verification of Green's - Stoke's and Gauss's Theorems.

**TEXT BOOKS**

1. A Text Book of Engineering Mathematics, Vol – 1, T.K.V. Iyengar, B. Krishna Gandhi and Others S. Chand & Company.
2. A Text Book of Engineering Mathematics, C. Sankaraiah, V.G.S. Book Links.
3. A Text Book of Engineering Mathematics-1, E. Rukmangadachari, E. Keshava Reddy, Pearson Education.

**REFERENCES**

1. A Text Book of Engineering Mathematics, B.V. Ramana, Tata Mc Graw Hill.
2. A Text Book of Engineering Mathematics, Thomson Book Collection.
3. A Text Book of Advanced Engineering Mathematics – A Computer Approach, N.Bail, M.Goyal & C.Watkins.
4. Engineering Mathematics, Sarveswara Rao Koneru, Universities Press.



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**AUTONOMOUS****CIVIL ENGINEERING**

I B.TECH. (REGULAR, 2010-11)

(Common to Branches: (ME &amp; CE))

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3+1*	5

**(A0302101) ENGINEERING MECHANICS****UNIT I****BASIC CONCEPTS** - System of forces– Moment of forces and its Application – Couples and Resultant of Force System**EQUILIBRIUM OF SYSTEM OF FORCES:** Free body diagrams –Types of Supports – Support reactions for beams with different types of loading – concentrated, uniformly distributed and uniformly varying loading.**UNIT II****ANALYSIS OF PERFECT FRAMES:** Types of frames – cantilever frames and simply supported frames – Analysis of frames using method of joints, Tension Coefficient method and methods of sections for vertical loads, horizontal loads and inclined loads.**UNIT III****FRICTION:** Types of friction– laws of Friction–Limiting friction–Cone of limiting friction– static and Dynamic Frictions – Motion of bodies – Wedge, Screw jack and differential Screw jack.**UNIT IV****CENTROID AND CENTER OF GRAVITY:** Centroids of simple figures – Centroids of Composite figures – Centre of Gravity of bodies – Centre of Gravity of Composite figures.  
(Simple problems only).**UNIT V****AREA MOMENT OF INERTIA** - Parallel axis and perpendicular axis theorems - Moments of Inertia of Composite Figures**MASS MOMENT OF INERTIA:** Moment of Inertia of Simple solids, Moment of Inertia of composite masses.( Simple problems only)**UNIT VI****KINEMATICS:** Rectilinear and Curve linear motion – Velocity and Acceleration – Motion of A Rigid Body – Types and their Analysis in Planar Motion.**UNIT VII****KINETICS :** Analysis as particles and Analysis as a Rigid Body in Translation – Central Forces of motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies – Work Energy Method – Equation for Translation – Work – Energy application to Particle Motion, Connection System – Fixed axis Rotation and Plane Motion.**UNIT VIII****MECHANICAL VIBRATIONS:** Definitions, Concepts. Simple harmonic motion. Free vibrations. Simple, Compound and Torsional pendulums- Numerical problems**TEXT BOOKS:**

1. Engineering Mechanics, Shames & Rao – Pearson Education.
2. Engineering Mechanics, Fedrinand L.Singer – B.S. Publishers.
3. Engineering Mechanics, Bhavikatti and Rajasekharappa.

**REFERENCES:**

1. Engineering Mechanics-Statics and dynamics, A.Nelson, Tata MCGraw-Hill Company.
2. Mechanics of Materials by Timoshenko & Gere, CBS.
3. Engineering Mechanics – B. Bhattacharya- Oxford University Publications.
4. Mechanics of Materials - Dr. B. C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publication.
5. Engineering Mechanics –Arthur P. Boresi and Richard J. Schmidt. – Brooks/Cole – Cengage Learning.

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## CIVIL ENGINEERING

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3+1*	6

### (A0501101) C PROGRAMMING AND DATA STRUCTURES

#### UNIT I

Overview of Computers and Programming - Electronic Computers then and Now, Computer Hardware, Computer Software, Algorithm, Flowcharts, Software Development Method, Applying the Software Development Method.

#### UNIT II

Introduction to C Language - C Language Elements, Variable Declarations and Data Types, Executable Statements, General Form of a C Program, Expressions, Precedence and Associativity, Expression Evaluation, Operators and Expressions, Type Conversions, Decision Statements - If and Switch Statements, Loop Control Statements - while, for, do-while Statements, Nested for Loops, Other Related Statements -break, continue, goto.

#### UNIT III

Functions - Library Functions, Top-Down Design and Structure Charts, Functions with and without Arguments, Communications Among Functions, Scope, Storage Classes - Auto, Register, Static, Extern, Scope rules, Type Qualifiers, Recursion - Recursive Functions, Preprocessor Commands.

Arrays - Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Using Array Elements as Function Arguments, Arrays Arguments, Multidimensional Arrays.

#### UNIT IV

Pointers - Introduction, Features of Pointers, Pointer Declaration, Arithmetic Operations With Pointers, Pointers and Arrays, Pointers and Two-Dimensional Arrays, Array of Pointers, Pointers to Pointers, Void Pointers, Memory Allocation Functions, Programming Applications, Pointer to Functions, Command- Line Arguments.

Strings - String Basics, String Library Functions, Longer Strings, String Comparison, Arrays of Pointers, Character operations, String-To-Number and Number-To- String Conversions, Pointers and Strings.

#### UNIT V

Structure and Union – Introduction, Features of Structures. Declaration and Initialization of Structures, Structure within Structure, Array of Structures, Pointer to Structure, Structure and Functions, typedef, Bit Fields, Enumerated Data Type, Union, Union of Structures.

#### UNIT VI

Files - Introduction, Streams and File Types, Steps for File Operations, File I/O Structures, Read and Write, Other File function, Searching Errors in Reading/Writing of Files, Low Level Disk I/O, Command Line Arguments, Application of Command Line Arguments, File Status functions (error handling).

#### UNIT VII

Data Structures - Overview of Data Structure, Representation of a Stack, Stack Related Terms, Operation on a Stack, Implementation of a Stack, Representation of Arithmetic Expressions, Infix, Prefix, and Postfix Notations, Evaluation of Postfix Expression, Conversion of Expression from Infix to Postfix, Recursion, Queues - Various Positions of Queue, Representation of Queue, Insertion, Deletion, Searching Operations.

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

#### UNIT VIII

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

#### TEXT BOOKS :

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education
2. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

#### REFERENCES :

1. Programming in C – Stephen G. Kochan, III Edition, Pearson Education.
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press.
3. C and Data Structures, a snapshot oriented treatise with live engineering examples, Dr.N.B.Venkateswarlu, Dr. E.V.Prasad, S. Chand.
4. C and Data Structures, E.Balaguruswamy, Tata Mc Graw Hill.
5. Data Structures using C – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI, Eighth Edition.

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**AUTONOMOUS****CIVIL ENGINEERING****I B.TECH. (REGULAR, 2010-11)**

(Common to all Branches)

For Branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E.

T	C
3+1*	6

**(A0301101) ENGINEERING DRAWING****UNIT – I**

**INTRODUCTION TO ENGINEERING DRAWING:** Principles of Engineering Graphics and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions.

Curves used in Engineering Practice:

- a) Conic Sections including the Rectangular Hyperbola – General method only.
- b) Cycloid, Epicycloids and Hypocycloid
- c) Involute.
- d) Helices

**UNIT – II**

**PROJECTION OF POINTS AND LINES:** Principles of Orthographic Projection – Conventions – First and Third Angle Projections. Projections of Points, Lines inclined to one or both planes, Problems on projections, Finding True lengths & traces only.

**UNIT – III**

**PROJECTIONS OF PLANES:** Projections of regular Plane surfaces, Projection of lines and planes using auxiliary planes.

**UNIT – IV**

**PROJECTIONS OF SOLIDS:** Projections of Regular Solids inclined to one or both planes – Auxiliary Views.

**UNIT – V**

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

Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid, Cone and their Sectional parts.

**UNIT – VI**

**ISOMETRIC & ORTHOGRAPHIC PROJECTIONS:** Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids - Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.

Conversion of Isometric Views to Orthographic Views - Conventions.

**UNIT – VII**

**INTERPENETRATION OF RIGHT REGULAR SOLIDS:** Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone, Square Prism Vs Square Prism.

**UNIT – VIII**

**PERSPECTIVE PROJECTIONS:** Perspective View: Plane Figures and Simple Solids, Vanishing Point Methods (General Method only).

**TEXT BOOKS:**

1. Engineering Drawing, N.D. Bhat / Charotar
2. Engineering Drawing, Johle /Tata McGraw-Hill
3. Engineering Drawing, Shah and Rana, 2/e Pearson education

**REFERENCES:**

1. Engineering Drawing and Graphics, Venugopal/ New age
2. Engineering Drawing, B.V.R. Guptha, J.K. Publishers
3. Engineering Drawing, K.L. Narayana, P. Khanniah, Scitech Pub
4. Engineering Drawing, Venkata Reddy, B.S.Publishers.

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**CIVIL ENGINEERING**

I B.TECH. (REGULAR, 2010-11)

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**(A0591101) C PROGRAMMING AND DATA STRUCTURES LAB****Objectives:**

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

**Recommended Systems/Software Requirements:**

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

**Exercise 1**

- a) Write a C program to find the sum of individual digits of a positive integer.
- b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
- c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

**Exercise 2**

- a) Write a C program to calculate the following Sum:  

$$\text{Sum} = 1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10!$$
- b) Write a C program to find the roots of a quadratic equation.

**Exercise 3**

Write C programs that use both recursive and non-recursive functions

- i) Find the factorial of a given integer.
- ii) To find the GCD (greatest common divisor) of two given integers.
- iii) To solve Towers of Hanoi problem.

**Exercise 4**

- a) The total distance travelled by vehicle in 't' seconds is given by distance  $S = ut + \frac{1}{2}at^2$  where 'u' and 'a' are the initial velocity (m/sec.) and acceleration ( $\text{m/sec}^2$ ) respectively. Write C program to find the distance travelled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.
- b) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, \*, /, % and use Switch Statement)

**Exercise 5**

- a) Write a C program to find both the largest and smallest number in a list of integers.
- b) Write a C program that uses functions to perform the following:
  - i) Addition of Two Matrices
  - ii) Multiplication of Two Matrices

**Exercise 6**

- a) Write a C program that uses functions to perform the following operations:
  - i) To insert a sub-string in to a given main string from a given position.
  - ii) To delete n Characters from a given position in a given string.
- b) Write a C program to determine if the given string is a palindrome or not

**Exercise 7**

- a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.
- b) Write a C program to count the lines, words and characters in a given text.

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**CIVIL ENGINEERING****Exercise 8**

- a) Write a C program to generate Pascal's triangle.
- b) Write a C program to construct a pyramid of numbers.

**Exercise 9**

Write a C program to read in two numbers, x and n, and then compute the sum of the geometric progression:

$$1+x+x^2+x^3+\dots+x^n$$

For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Print x, n, the sum

Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if  $n < 0$ , then go back and read in the next pair of numbers of without computing the sum. Find if any values of x are also illegal? If so, test for them too.

**Exercise 10**

- 1) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
- 2) Write a C program to convert a Roman numeral to its decimal equivalent.

**Exercise 11**

Write a C program that uses functions to perform the following operations:

- i) Reading a complex number
- ii) Writing a complex number
- iii) Addition of two complex numbers
- iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

**Exercise 12**

- a) Write a C program which copies one file to another.
- b) Write a C program to reverse the first n characters in a file.

(Note: The file name and n are specified on the command line.)

**Exercise 13**

- a) Write a C programme to display the contents of a file.
- b) Write a C programme to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

**Exercise 14**

Write a C program that uses functions to perform the following operations on singly linked list.:

- i) Creation
- ii) Insertion
- iii) Deletion
- iv) Traversal

**Exercise 15**

Write C programs that implement stack (its operations) using

- i) Arrays
- ii) Pointers

**Exercise 16**

Write C programs that implement Queue (its operations) using

- i) Arrays
- ii) Pointers

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**Exercise 17**

Write a C program that uses Stack operations to perform the following:

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

**Exercise 18**

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

- i) Bubble sort
- ii) Selection sort

**Exercise 19**

Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:

- i) Linear search
- ii) Binary search

**Exercise 20**

Write C program that implements the Quick sort method to sort a given list of integers in ascending order.

**Exercise 21**

Write C program that implement the Merge sort method to sort a given list of integers in ascending order.

**Exercise 22**

Write C programs to implement the Lagrange interpolation and Newton - Gregory forward interpolation.

**Exercise 23**

Write C programs to implement the linear regression and polynomial regression algorithms.

**Exercise 24**

Write C programs to implement Trapezoidal and Simpson methods.

**REFERENCE BOOKS**

1. The Spirit of C, an introduction to modern programming, M.Cooper, Jaico Publishing House.
2. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publications.
3. Computer Basics and C Programming, V. Rajaraman, PHI Publications.
4. Programming in C and Data Structures, J.R.Hanly, Ashok.N.K.Kamthane and A.Ananda Rao, Pearson Education.

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**AUTONOMOUS****CIVIL ENGINEERING****I B.TECH. (REGULAR, 2010-11)**

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**(A0391101) ENGINEERING AND IT WORKSHOP****ENGINEERING WORKSHOP**

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

**1. TRADES FOR EXERCISES:**

- Carpentry shop– Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, cross lap joint, mortise and tenon T joint, Bridle T joint from out of 300 x 40 x 25 mm soft wood stock.
- Fitting shop– Two joints (exercises) from: square joint, V joint, half round joint or dove tail joint out of 100 x 50 x 5 mm M.S. stock.
- Sheet metal shop– Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22 or 20 gauge G.I. sheet.
- House-wiring– Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.
- Foundry– Preparation of two moulds (exercises): for a single pattern and a double pattern.
- Welding – Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint.

**2. TRADES FOR DEMONSTRATION:**

- Plumbing
- Machine Shop
- Metal Cutting

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

**REFERENCE BOOKS:**

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



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**IT WORKSHOP**

**Objectives:**

The IT Workshop for engineers is a training lab course. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

**PC Hardware** introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on a working PC (PIV or higher) to disassemble and assemble back to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.**

**Internet & World Wide Web** module introduces the different ways of hooking the PC on to the internet from home and workplace for usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

**Productivity tools** module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX. **(It is recommended to use Microsoft office 2007 in place of MS Office 2003)**

**PC Hardware**

**Exercise 1 - Task 1:** Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

**Exercise 2 - Task 2:** Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video shall be given as part of the course content.

**Exercise 3 - Task 3:** Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

**Exercise 4 - Task 4:** Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

**Exercise 5 - Task 5: Hardware Troubleshooting:** Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

**Exercise 6 - Task 6: Software Troubleshooting:** Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

**OFFICE TOOLS****LaTeX and Word**

**Exercise 7 - Word Orientation:** The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.



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**Task 1: Using LaTeX and Word** to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

**EXCEL**

**Exercise 8 - Excel Orientation:** The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

**Task 1: Creating a Scheduler** - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

**LaTeX and MS/equivalent (FOSS) tool Power Point**

**Exercise 9 - Task1:** Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this Exercise includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Powerpoint. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

**Exercise 10 - Task 2 :** Second Exercise helps students in making their presentations interactive. Topic covered during this Exercise includes : Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

**Internet & World Wide Web****2 Exercises**

**Exercise 11 - Task 1: Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

**Web Browsers, Surfing the Web:** Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers.

**Exercise 12 - Task 2: Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated by the student to the satisfaction of instructors.

**Cyber Hygiene:** Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an anti virus software, configure their personal firewall and windows update on their computer.

**REFERENCES:**

- 1) Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
- 2) LaTeX Companion – Leslie Lamport, PHI/Pearson.
- 3) Introduction to Computers, Peter Norton, 6/e Mc Graw Hill
- 4) Upgrading and Repairing, PC's 18<sup>th</sup> e, Scott Muller QUE, Pearson Education
- 5) Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dreamtech
- 6) IT Essentials PC Hardware and Software Companion Guide, Third Edition by David Anfinson and
- 7) Ken Quamme. – CISCO Press, Pearson Education.

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**AUTONOMOUS****CIVIL ENGINEERING****I B.TECH. (REGULAR, 2010-11)**

(Common to all Branches)

For Branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E.

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**(A0091101) ENGINEERING PHYSICS & ENGINEERING CHEMISTRY LAB*****ENGINEERING PHYSICS LAB***Any TEN of the following experiments are to be performed during the Academic year.

<b>S.No</b>	<b>Name of the Experiment</b>
1.	Determination of wavelength of given source – spectrometer – normal incidence method
2.	Dispersive power of the prism – Spectrometer
3.	Determination of wavelength of a laser source - Diffraction Grating
4.	Determination of particle size by using a laser source
5.	Determination of thickness of a thin wire using parallel fringes
6.	Newton's Rings
7.	Magnetic field along the axis of a current carrying coil – Stewart and Gee's method
8.	Numerical aperture of an optical fiber
9.	Hall Effect
10.	B – H Curve
11.	Energy gap of a material of p-n junction
12.	Determination of rigidity modulus of a wire material – Torsional pendulum
13.	Determination of dielectric constant
14.	Verification of laws of stretched string – Sonometer
15.	Melde's experiment – Transverse & Longitudinal modes

Equipment required:

Spectrometer, Grating, Prism, Mercury vapour lamp, Sodium vapour lamp, Travelling Microscope, Wedge arrangement, Newton rings setup, Stewart-Gee's apparatus, He-Ne laser source, Optical fiber, Hall effect kit, B-H loop kit, Energy gap kit (four probe method), Torsional pendulum, Dielectric constant kit, Sonometer, Melde's apparatus

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**CIVIL ENGINEERING*****ENGINEERING CHEMISTRY LAB***

<b>S.No</b>	<b>Name of the Experiment</b>
1)	Preparation of Standard Potassium Dichromate and Estimation of Ferrous Iron
2)	Preparation of Standard Potassium Dichromate and Estimation of Copper, by Iodometry
3)	Preparation of Standard EDTA solution and Estimation of Hardness of Water
4)	Preparation of Standard EDTA and Estimation of Copper
5)	Determination of Manganese in Steel and Iron in Cement
6)	Determination of strength of the given Hydrochloric acid against standard sodium hydroxide solution by Conductometric titration
7)	Determination of viscosity of the oils through Redwood viscometer
8)	Determination of calorific value of fuel using Bomb calorimeter
9)	Estimation of dissolved oxygen
10)	Determination of Eutectic Temperature of binary system (Urea – Benzoic Acid)

**BOOKS:**

1. Chemistry-lab manual by Dr K.N.Jayaveera and K.B. Chandra Sekhar, S.M.Enterprizes Ltd.
2. Vogel's Book of Quantitative Inorganic Analysis, ELBS Edition.

**Equipment Required:**

- ♣ Glass ware: Pipettes, Burettes, Volumetric Flasks, Beakers, Standard flasks, Measuring jars, Boiling Test tubes, reagent bottles, (Borosil)
- ♣ Analytical balance (kero) (15 Nos)
- ♣ Calorimeter
- ♣ Bomb Calorimeter
- ♣ Redwood viscometer No.1 & No.2
- ♣ Conductometer/ Conductivity bridge
- ♣ Wash bottles, test tube stands, burette stands
- ♣ Gas cylinders with Bunsen burners
- ♣ Chemicals: Hydrochloric acid, sodiumhydroxide, EDTA, EBT indicator, fast sulfon black-f, urea, benzoic acid, methanol, Mohr's salt, copper sulphate, magnesium sulphate, ammonia, ammonium sulphate, calcium sulphate etc.,

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**CIVIL ENGINEERING**

I B.TECH. (REGULAR, 2010-11)

(Common to all Branches)

For Branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E.

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**(A0092101) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB**

The **Language Lab** focuses on the production and practice of sounds of language and equips students with the use of English in everyday situations and contexts.

**Objectives:**

1. To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills
2. To expose the students to a varied blend of self-instructional, learner-friendly modes of language learning
3. To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm
4. To initiate them into greater use of the computer in resume preparation, report- writing, format-making etc.
5. To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required ability to face computer-based competitive exams such GRE, TOEFL, GMAT etc.

**SYLLABUS:**

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

- ♣ Introduction to the Sounds of English - Vowels, Diphthongs & Consonants.
- ♣ Introduction to Stress and Intonation.
- ♣ Situational Dialogues (giving directions etc.)
- ♣ Speaking on the mobiles and telephone conversation.
- ♣ Role Play.
- ♣ Oral Presentations- Prepared and Extempore.
- ♣ 'Just A Minute' Sessions (JAM).
- ♣ Describing Objects / Situations / People.
- ♣ Information Transfer.
- ♣ Debate

**Minimum Requirement:**

**The English Language Lab shall have two parts:**

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

**System Requirement (Hardware component):**

*Computer network with Lan with minimum 60 multimedia systems with the following specifications:*

- ♣ P – IV Processor
- ♣ Speed – 2.8 GHZ
- ♣ RAM – 512 MB Minimum
- ♣ Hard Disk – 80 GB
- ♣ Headphones of High quality

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**CIVIL ENGINEERING****PRESCRIBED SOFTWARE: GLOBARENA****Suggested Software:**

- ♣ Cambridge Advanced Learners' English Dictionary with CD.
- ♣ The Rosetta Stone English Library
- ♣ Clarity Pronunciation Power – Part I
- ♣ Mastering English in Vocabulary, Grammar, Spellings, Composition
- ♣ Dorling Kindersley series of Grammar, Punctuation, Composition etc.
- ♣ Language in Use, Foundation Books Pvt Ltd with CD
- ♣ Learning to Speak English - 4 CDs
- ♣ Microsoft Encarta with CD
- ♣ Murphy's English Grammar, Cambridge with CD
- ♣ English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

**Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):**

1. English Pronouncing Dictionary Daniel Jones Current Edition with CD.
2. Spoken English- R. K. Bansal and J. B. Harrison, Orient Longman 2006 Edn.
3. Speaking English Effectively by Krishna Mohan & NP Singh (Macmillan)
4. A Practical Course in English Pronunciation, (with two Audio cassettes) by J. Sethi, Kamlesh Sadanand & D.V. Jindal, Prentice-Hall of India Pvt. Ltd., New Delhi.
5. Body Language , Your Success Mantra , Dr Shalini Verma, S.Chand & Co, 2008
6. English Dictionary for Advanced Learners, (with CD) International edn. Macmillan 2009
7. A Handbook for English language Laboratories, E.Sureshkumar, P.Sreehari, Foundation Books, 2009
8. DELTA's key to the Next Generation TOEFL Test, 6 audio CDS, New Age International Publishers, 2007

**DISTRIBUTION AND WEIGHTAGE OF MARKS*****English Language Laboratory Practical Paper:***

- ♣ The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
- ♣ For the Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 year-end Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

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**CIVIL ENGINEERING**

II B.Tech. I-Sem

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**(A0006103) MATHEMATICS-II**  
 (Common to ME, CIVIL)
**Course Objectives:**

- The course objective is to impart analytical skills to the students in the areas of boundary value problems and transform techniques. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.
- An engineering student needs to have some basic mathematical tools and techniques which emphasize the development of rigorous logical thinking and analytical skills. Based on this the course aims at giving adequate exposure to the theory and applications of Fourier series, Fourier Transforms, PDE, and BVP

**Course Outcomes:**

- An ability to apply knowledge of engineering, information technology, mathematics, and science
- An ability to identify, formulate and solve engineering problems

**UNIT-I**

Matrices: Elementary row transformation-Rank-Normal form-Echelon form-Consistency-Solution of system of simultaneous linear homogeneous and non-homogeneous equations.

Eigen values, Eigenvectors-properties-Cayley –Hamilton Theorem-Inverse and powers of a matrix by Cayley –Hamilton Theorem.

**UNIT-II**

Real matrices: Symmetric, Skew-symmetric, Orthogonal Complex matrices: Hermitian, Skew-Hermitian and Unitary Matrices and their properties- Quadratic forms-Reduction of quadratic form to canonical form- Rank-Positive, negative definite-semi definite-index-signature.

**UNIT-III**

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

Fourier integral theorem (only statement)-Fourier sine and cosine integrals. Fourier transform-Fourier sine and cosine transforms- properties-Inverse transforms-Finite Fourier transforms.

**UNIT-IV**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions-Method of separation of variables- Solution of one Dimensional wave equation, heat equation under two dimensional Laplace's equation under initial and boundary conditions.

**UNIT – V**

Solution of Algebraic and Transcendental Equations: Introduction – The Bisection Method – The Method of False Position Method – The Iteration Method – Newton Raphson Method.

**Interpolation:** Introduction – Finite differences – Forward difference – Back ward differences – Newton's forward and back ward difference formulae for interpolation formula – Lagrange's Interpolation formula.

**UNIT-VI**

Curve fitting: Fitting a straight line-Second degree curve-Exponential curve-Power curve by method of least squares. Numerical Differentiation and Integration- Trapezoidal rule-Simpson's 1/3 rule-Simpson's 3/8 rule.

Numerical solutions of Ordinary Differential Equations:Solution by Taylor's series-Picard's Method of Successive Approximations-Euler's Method-Runge-Kutta Methods- Predictor-Corrector Method-Milne's Method.

**TEXT BOOKS:**

1. Mathematical Methods by Dr. T.K.V. Iyengar, B. Krishna Gandhi and others, S.Chand and company.
2. Mathematical Methods by Dr. K.V. Suryanarayana Rao – SCITECH Publications.
3. A Text book of Engineering Mathematics – 1, by B.V. Ramana, Tata McGraw Hill .

**REFERENCES:**

1. Advanced Engineering Mathematics by Erwin Kreyszig - Wiley Publications.
2. Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.
3. A text book of Engineering Mathematics by N.P.Bali, Iyengar – Lakshmi Publications (Pvt ltd)

# RAJEEV GANDHI MEMORIAL COLLEGE OF ENGG. & TECH., NANDYAL-518 501

AUTONOMOUS

## CIVIL ENGINEERING

II B.Tech. I-Sem

T	C
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### (A0201103) ELECTRICAL AND ELECTRONICS ENGINEERING

#### Course Objectives:

- At the completion of this course student should be able to know about the connection of various electrical components and capable to analyze the performance of DC machines, transformers and ac machines in practically.
- Further, in this course student should be able to understand the working of semiconductor devices, amplifiers and rectifiers in practically.
- Further, in this course student should be able to know how to use the CRO to measure quantities and observe different wave forms

#### Course Outcomes:

- In order to assess the students progress towards achieving the learning outcomes, assigned readings, lecturers and assignments to enable the students to understand the concept and importance of the Electrical & Electronics Engineering subject.
- Moreover students gain lot of information from references, technical magazine which are available in college library & from surfing the internet regarding the detail construction & working of electrical machines, measuring instruments & power semi conductor devices

#### UNIT – I

**ELECTRICAL DC CIRCUITS:** Basic definitions (electrical conductor, insulator, semiconductor, electrical circuit, electric current, electric potential, EMF and electric potential difference) - Types of elements(active and passive elements)- Ohm's Law and its limitations-electric power-electrical energy- Kirchhoff's Laws- Resistances in series- Resistances in parallel- Star to delta and delta to star transformations –DC super position theorem and thevenin's theorem-simple problems.

#### UNIT – II DC MACHINES

**DC-GENERATOR:** Working Principle and construction of DC Generator– induced emf equation – types of DC Generators-simple problems regarding EMF.

**DC MOTOR:** Working Principle of DC Motor-types of DC Motors -back emf -torque equation –speed control of DC Shunt Motor – applications of DC machines -losses in DC machines- Swinburne's test and efficiency calculation –simple problems.

#### UNIT - III

**TRANSFORMERS:** Principle of operation of single phase transformers –Constructional features –Theory of an Ideal Transformer- EMF equation –Practical Transformer on no load and load–Equivalent circuit-Impedance Ratio-Shifting of Impedances – losses- regulation -OC & SC test- efficiency –simple problems.

#### UNIT - IV

**ELECTRICAL INSTRUMENTS:** Introduction-Types of electrical instruments –Principle of Operation of indicating instruments– Essentials of Indicating Instruments-Deflecting Torque-Controlling Torque –Damping Torque-PMMC and Moving Iron Instruments (Operation and Construction only).

#### UNIT - V

**DIODE AND ITS CHARACTERISTICS:** Formation of n- type and p-type semiconductor – Construction of P-n junction diode, symbol - V-I Characteristics- Diode Applications-Rectifiers – Half wave-Full wave-mid point and bridge type-simple Problems.

#### UNIT - VI

**TRANSISTORS and CRO:** Formation of PNP and NPN transistors – CE configuration of NPN and PNP transistors- applications -Transistor as an amplifier-SCR characteristics and applications- construction and Principle of CRO(operation only)-Applications.

#### TEXT BOOKS:

1. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand & Co.
2. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.
3. Principles of Electronics by V.K.Mehta, S.Chand & Co.

#### REFERENCES:

1. Basic Electrical Engineering by Kothari and Nagarath, TMH Publications, 2nd Edition.
2. Electronics and Devices by Salivahan, TMH Publications



**CIVIL ENGINEERING**

II B.Tech. I-Sem

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3+1\* 4**(A0101103) STRENGTH OF MATERIALS – I****Course Objectives:**

- Provide knowledge about stress, strain, SF, BM, strain energy
- Provide understanding & estimation of bending & shear stresses in beams.
- Provide knowledge in estimating the deflection in beams
- Provide knowledge in estimating torsion stresses
- Learning about compression members & buckling phenomenon

**Course Outcomes:**

- Able differentiate between direct stresses, bending stress, torsion stress, shear stress.
- Estimate the stresses in members subjected to simple loading.
- Estimate the deflection in beams.
- Estimate the buckling load of compression member

**UNIT – I**

**SIMPLE STRESSES AND STRAINS:** Elasticity and plasticity – Types of stresses and strains – Hook's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses.

**UNIT – II**

**SHEAR FORCE AND BENDING MOMENT:** Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

**UNIT – III**

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

**SHEAR STRESSES:** Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.

**UNIT – IV**

**DEFLECTION OF BEAMS:** Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. Uniformly varying load.-Mohr's theorems – Moment area method – application to simple cases including overhanging beams.

**UNIT – V**

**TORSION OF CIRCULAR SHAFTS:** Theory of pure torsion – Derivation of Torsion equations:  $T/J = q/r = N\theta/L$  – Assumptions made in the theory of pure torsion – Torsion moment of resistance – Polar section modulus – Power transmitted by shafts

**UNIT – VI**

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



**CIVIL ENGINEERING****TEXT BOOKS:**

1. Strength of Materials by S. Ramamrutham
2. Strength of Materials by B.C. Punmia
3. Mechanics of Materials by Gere & Timoshenko

**REFERENCES:**

1. Mechanics of Solid, by Ferdinandp Beer and others – Tata Mc.Grawhill Publications 2000.
2. Strength of Materials by Schaum's out line series – Mc. Graw hill International Editions.
3. Strength of Materials by S. Ramakrishna and R.Narayan – Dhanpat Rai publications.
4. Strength of materials by R.K.Rajput, S.Chand & Co, New Delhi.
5. Strength of Materials by A.R.Basu, Dhanpat Rai & Co, Nai Sarah, New Delhi.
6. Strength of Materials by L.S.Srinath et al., Macmillan India Ltd., Delhi.
7. Mechanics of Structures, by S.B. Junnarkar, Charotar Publishing House, Anand, Gujrat.
8. Mechanics of Solids by Poppov

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**CIVIL ENGINEERING**

II B.Tech. I-Sem

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**(A0102103) SURVEYING****Course Objectives:**

- The course objective covers the calculation of areas and volumes of the particular land, usage levelling instrument, total station instrument, Theodolite instrument, setting of curves

**Course Outcomes:**

- Identify the land profile
- Student can easily calculate the horizontal and vertical angles, heights, areas, volumes of the given structure

**UNIT – I**

**INTRODUCTION:** Definition of surveying, importance of surveying to civil Engineers, objectives of surveying, classification of surveying, principles of surveying

**CHAIN SURVEYING:** Methods of measuring distance-Types of chains-chaining on plane and sloping ground-Field work-Booking of field notes-Basic problems in chaining-Determination of area by chain survey

**UNIT – II:**

**COMPASS SURVEYING:** Working of prismatic & surveyor compass-Temporary & permanent adjustments-Designation of bearing-Reduced bearing-Fore and back bearing-Determination of included angles from measured bearings.

**Plane table survey:** Description of plane table-Temporary Adjustments-Setting up the plane table-Methods of plane table surveying.

**UNIT – III**

**LEVELING AND CONTOURING:** Concept and Terminology, Temporary and permanent adjustments-method of leveling. Characteristics and Uses of contours- methods of conducting contour surveys and their plotting.

**UNIT – IV**

**COMPUTATION OF AREAS AND VOLUMES:** Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

**UNIT - V**

**THEODOLITE AND TACHEOMETRIC SURVEYING:** Theodolite, description, uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles, Trigonometrical leveling. Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.

**UNIT – VI**

**Curves And Total station survey:** Types of curves, design and setting out – simple and compound curves-Features of Total station-setting up and orienting a Total station-Electronic Data Recording.

**TEXT BOOKS:**

- “Surveying (Vol – 1, 2 & 3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) Ltd., New Delhi
- Surveying and leveling by R. Subramanian, Oxford university press, New Delhi

**REFERENCES:**

- Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill – 2000
- Arora K R “Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004
- Chandra A M, “Plane Surveying”, New age International Pvt. Ltd., Publishers, New Delhi, 2002.
- Chandra A M, “Higher Surveying”, New age International Pvt. Ltd., Publishers, New Delhi, 2002.
- Duggal S K, “Surveying (Vol – 1 & 2), Tata Mc.Graw Hill Publishing Co. Ltd. New Delhi, 2004.

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## CIVIL ENGINEERING

II B.Tech. I-Sem

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### (A0103103) FLUID MECHANICS

#### Course Objectives:

- The study of fluid is a matter of great interest to scientists, engineers and medical professionals. A good understanding of the mechanics of fluids is crucial for almost every activity be it the flying of aeroplanes or the designing of ships or even the launching of a satellite. This course covers the topics of properties of fluids, fluid statics, fluid dynamics, laminar & turbulent flows, Bernollis applications such as pipe flows and flow through orifices, mouthpieces, noches etc.,

#### Course Outcomes:

- Fundamental knowledge and understanding of the mechanics of fluid at rest and in motion by describing and observing fluid phenomena and by developing and using the principles and laws for analyzing fluid interactions with natural and constructed systems.
- Also gets the basis for subsequent courses involving the analysis, design and/or operation of engineered systems: water and waste water treatment facilities; flooding, erosion and wave impacts on river, lake and coastal areas; transport and mixing of chemicals and sediments; and earth and solid structures for containing fluids.

#### UNIT – I

**INTRODUCTION, and HYDROSTATICS :** Dimensions and units – Physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion

**PRESSURE and MEASUREMENT:** pressure at a point, Pascal's law, Hydrostatic law - atmospheric, gauge and vacuum pressure- measurement of pressure. Pressure gauges, Manometers: differential and Micro Manometers (no problems)

**HYDROSTATICS:** Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure. Derivations and problems.

#### UNIT – II

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

**FLUID DYNAMICS:** Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, Momentum equation and its application – forces on pipe bend.

#### UNIT – III

**BOUNDARY LAYER THEORY:** Boundary layer – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation

**FLOW AROUND SUBMERGED OBJECTS:** Drag and Lift- Magnus effect.

#### UNIT – IV

**LAMINAR & TURBULENT FLOWS:** Reynold's experiment – Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long tubes, flow through inclined tubes.

#### UNIT - V

**CLOSED CONDUIT FLOW:** Laws of Fluid friction – Darcy's equation, Minor losses (types), equation for head loss due to sudden expansion – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line, variation of friction factor with Reynold's number – Moody's Chart.

#### UNIT – VI

**MEASUREMENT OF FLOW:** Pitot tube, Venturi meter and orifice meter – classification of orifices, flow over rectangular, triangular and trapezoidal and stepped notches - –Broad crested weirs.

#### TEXT BOOKS:

- Fluid Mechanics by Modi and Seth, Standard book house.
- A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) Ltd., New Delhi

#### REFERENCES:

- Fluid Mechanics by J.F.Douglas, J.M. Gaserek and J.A.Swaffirld (Longman)
- Fluid Mechanics by Frank.M. White (Tata Mc.Grawhill Pvt. Ltd.)
- Fluid Mehanics by A.K. Mohanty, Prentice Hall of India Pvt. Ltd., New Delhi
- Introduction to Fluid Machines by S.K.Som & G.Biswas (Tata Mc.Grawhill publishers Pvt. Ltd.)
- Introduction to Fluid Machines by Edward J. Shaughnessy, Jr, Ira M. Katz and James P. Schaffer, Oxford University Press, New Delhi

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**AUTONOMOUS****CIVIL ENGINEERING**

II B.Tech. I-Sem

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**(A0104103) BUILDING MATERIALS AND CONSTRUCTION****Course Objectives:**

- The course objective covers the building bye laws, Residential buildings, public buildings, sign conventions, residential building plans

**Course Outcomes:**

- Able to understand the building bye laws of the districts and states
- Standard dimensions of the residential buildings and public buildings

**UNIT - I**

**Stones, bricks, tiles, lime and cement:** Discussion of different types of rocks formations, properties & classification of good building stones, stone quarrying, precautions in blasting and dressing of stones. Composition of good brick earth, various methods of manufacture of bricks. Comparison of clamp and kiln burning. Qualities of good bricks. types of tiles, manufacturing method.

Various ingredients of lime, constituents of lime stone, classification of lime. Manufacturing of cement and various types of cements .

**UNIT - II**

**Wood:** Structure- properties- seasoning of timber-Defects in timber. Various types of woods used in buildings. Alternative materials for wood, iron steel, aluminum.

**UNIT - III**

**Cement concrete:** Various ingredients of cement concrete such as cement, fine aggregate and coarse aggregate and their importance, preparation of concrete, discussion of different types of grades of concrete .Discussion on various tests for cement, fine aggregate and coarse aggregate as per codes of practices.

**UNIT -IV**

**Masonry:** Types of masonry, discussions on various types of masonry's. Types of bonds and their discussions.

**UNIT -V**

**Foundations and Building components:** Shallow foundations. Spread, combined, strap and mat footings. Lintels, arches, staircase types. 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.

**UNIT – VI**

**Building finishing:** Discussion on damp proofing and water proofing materials used. Plastering, pointing, white washing and distempering – painting- constituents of paint –types of paints – painting of new and old wood-varnish- formwork and scaffolding.

**TEXT BOOKS:**

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

**REFERENCES:**

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

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**AUTONOMOUS****CIVIL ENGINEERING**

II B.Tech.I-Sem

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3	2

**(A0007103) APTITUDE ARITHMETIC REASONING & COMPREHENSION****Course Objectives:**

- Provides mathematical, logical thinking, reasoning, analytical skills

**Course Outcomes:**

- Can be able to solve the aptitude, reasoning questions very quickly in competitive examinations

**UNIT I:**

Numbers, Number Systems Simple Equations, Ratio, Proportion, Variation Quadratic Equations, Progressions Percentages.

**UNIT II:**

Profit, Loss, Partnerships Averages, Mixtures & Allegations, Simple Interest, Compound Interest Time and Work-Pipes, indices, surds, inequalities ,Cisterns Time and Distance Geometry and Menstruation.

**UNIT III:**

Permutations & Combinations and Probability Data Interpretation & Data Sufficiency.

**UNIT IV:**

Number & Letter Series, Analogies, Coding Decoding, Odd Man Out Blood Relations.

**UNIT V:**

Direction Sense, Symbols and Notations Deductions & Connectives Clocks, Calendars Analytical

**UNIT VI:**

Reasoning (Distribution+ Binary Logic + Puzzles) Cubes, Venn Diagrams Analytical Puzzles (Linear + Circular +Selections + Sequencing + Routes & Networks + Comparisons) and Non Verbal Reasoning

**REFERENCES:**

1. R.S.Agarwal “Quantitative Techniques” S.Chand Series
2. Shankuntala Devi “Techniques of Reasoning” S.Chand Series

**CIVIL ENGINEERING**

II B.Tech.I-Sem

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3	2

**(A0191103) SURVEYING LAB – I****Course Objectives:**

- Provides basic knowledge about chain surveying, compass surveying, levelling

**Course Outcomes:**

- Able to do Surveying using any or combination of chain, compass and Auto level for specific problem.

**LIST OF EXERCISES:**

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

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**AUTONOMOUS****CIVIL ENGINEERING**

II B.Tech.I-Sem

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**(A0192103) STRENGTH OF MATERIALS LAB****Course Objectives:**

- The course objective of this subject consists. Shear, tension, bending test, hardness, spring, impact, torsion, Maxwell's reciprocal theorem on beam

**Course Outcomes:**

- Graduates will develop the testing knowledge so from this course students were developing the practical knowledge.

1. Tension test
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges
12. Continuous beam – deflection test.

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**AUTONOMOUS****CIVIL ENGINEERING**

II B.Tech.I-Sem

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**(A0291103) ELECTRICAL & ELECTRONICS ENGINEERING LAB****Course Objectives:**

- At the completion of this course student should be able to know about the connection of various electrical components and capable to analyze the performance of DC machines, transformers and ac machines in practically.
- Further, in this course student should be able to understand the working of semiconductor devices, amplifiers and rectifiers in practically.
- Further, in this course student should be able to know how to use the CRO to measure quantities and observe different wave forms

**Course Outcomes:**

- In order to assess the students progress towards achieving the learning outcomes, assigned readings and lectures to enable the students to understand the concept and importance of the Electrical & Electronics Engineering lab.
- Moreover students gain lot of information from references, technical magazine which are available in college library & from surfing the internet regarding the detail construction & working of electrical machines, measuring instruments & power semiconductor devices

**Section - A:****Electrical Engineering Lab:** (Any five experiments)

1. Verification of super position theorem
2. Verification of thevenin theorem
3. Speed control of D.C. Shunt motor by
  - a) Armature Voltage control. b) Field flux control method
4. Swinburne's test on D.C. Shunt machine (Predetermination of efficiency of a given D.C. Shunt machine working as motor and generator).
5. Brake test on D.C Shunt Motor
6. OC and SC tests on single phase transformer (Predetermination of efficiency at given power factors)

**Section - B :****Electronics Engineering Lab:** (Any five experiments)

1. PN-junction diode characteristics
2. Half wave Rectifier with and without filters
3. Full wave center tapped Rectifier with and without filters
4. Transistor CE Characteristics (Input and Output)
5. CE Amplifiers
6. Study of CRO(Voltage and time measurements)



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**RAJEEV GANDHI MEMORIAL COLLEGE OF ENGG. & TECH., NANDYAL-518 501**


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**AUTONOMOUS****CIVIL ENGINEERING**

II B.Tech. II-Sem

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**(A0011103) PROBABILITY AND STATISTICS**

(Common to CSE, IT, ME,CE)

**Course Objective:**

- At the end of the course, the students would acquire skills in handling situations involving more than one random variable and functions of random variables. Be introduced to the notion of sampling distributions and have acquired knowledge of statistical techniques useful in making rational decision in management problems. Be exposed to statistical methods designed to contribute to the process of making scientific judgments in the face of uncertainty and variation.
- With the present development of the computer technology, it is necessary to develop efficient algorithms for solving problems in science, engineering and technology. This course aims at giving exposure to Probability Theory, Theory of Sampling, Statistical Quality Control, Difference Equation, Z-transform and Simulation. The topics have been designed to use the mathematical tools and techniques for solving problems in engineering and for the development of logical thinking and analytical skills.

**Course Outcomes:**

- By the end of module students will be expected to demonstrate knowledge of
- Probability, Conditional Probability, Baye's theorem and its application
- Random variables, Discrete random variables, Continuous random variables
- Binomial Distribution, Poisson Distribution, Normal Distribution
- Population & Samples, Sampling Distribution of means
- Point Estimation, interval Estimation, Bayesian Estimation
- Tests of Hypothesis, Z – Distribution, Student t – test, F – test, Chi square test
- Queuing theory, Basic Queuing process, Transient & Steady states, pure birth & Death process.

**UNIT – I :** Probability: Sample Space and events – Probability – The axioms of Probability – Some Elementary theorems – Conditional Probability – Baye's theorem.

**UNIT – II :** Random Variables: Discrete and continuous - Distribution – Distribution functions – Properties – Discrete Random variables – Probability mass function – Continuous Random variables – Probability density function.

**UNIT – III:** Binomial, Poisson and Normal distributions – Related properties – Fitting distributions.

**UNIT – IV :** Sampling distribution: Population and samples -Sampling distribution of mean (known and unknown) Estimation: Point estimation – Interval estimation – Bayesian estimation.

**UNIT – V :** Test of Hypothesis – Means – Proportions – Hypothesis concerning one and two means – One tail, two tail tests – Type I and Type II errors.

**UNIT – VI :** Tests of significance – Student's t –test, F – test,  $\chi^2$  test – Good ness of fit – Contingency test.

**TEXT BOOKS:**

- Probability and Statistics by T.K.V. Iyengar, B. Krishna Gandhi and others, S.Chand and company.
- A Text book of Probability and Statistics by Dr. Shahnaz Bathul.
- Engineering Mathematics by B.V. Ramana, Tata McGraw Hill .

**REFERENCES:**

- Fundamental Mathematical Statistics by S.C. Gupta and V.K. Kapoor – S. Chand Co
- A text book of Engineering Mathematics by N.P. Bali, Iyengar – Lakshmi Publications (Pvt ltd)
- Engineering Mathematics – III by Dr.M.K. Venkat araman –The National Publishing co.

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**AUTONOMOUS****CIVIL ENGINEERING**

II B.Tech. II-Sem

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**(A0105104) STRENGTH OF MATERIALS – II****Course Objectives:**

- Students can learn how to analyze beams which are subjected to complex stresses; also learn different theories to be considered while designing any structures or material. Knowledge on fluid tubes subjected to pressure will be imparted. Also, knowledge on bending stresses in masonry structures, design of beams curved in plan and can learn details about unsymmetrical section.

**Course Outcomes:**

- Can be able to analyze structures subjected complex stresses
- Can be able to design masonry structures
- Can be able to design thin and thick cylinder & shells
- Can be able to analyze unsymmetrical sections
- Can be able to understand concepts on curved beams in field

**UNIT – I**

**PRINCIPAL STRESSES AND STRAINS:** Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions - Combined bending and torsion and end thrust

**UNIT – II**

**THEORIES OF FAILURES:** Introduction – Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory. Design of shafts according to theories of failure.

**UNIT – III**

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

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

**UNIT – IV**

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

**UNIT – V**

**UNSYMMETRICAL BENDING:** Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis Deflection of beams under unsymmetrical bending.

**UNIT – VI**

**BEAMS CURVED IN PLAN:** Introduction – circular beams loaded uniformly and supported on symmetrically placed Columns – Semi-circular beam simply-supported on three equally spaced supports.

**TEXT BOOKS:**

1. Strength of Materials by S. Ramamrutham
2. A Text book of Strength of materials by R.K.Bansal –Laxmi Publications (P) ltd., New Delhi
3. Strength of Materials by B.C. Punmia
4. Mechanics of Materials by Gere & Timoshenko

**REFERENCES:**

1. Mechanics of Solid, by Ferdinandp Beer and others – Tata Mc.Grawhill Publications 2000.
2. Strength of Materials by Schaum's out line series – Mc. Graw hill International Editions.
3. Strength of materials by R.K.Rajput, S.Chand & Co, New Delhi.
4. Strength of Materials by L.S.Srinath et al., Macmillan India Ltd., Delhi.
5. Mechanics of Solids by Poppov
6. Introduction to Strength of Materials by U.C. Jindal, Galgotia publications.
7. Strength of materials by R. Subramanian, Oxford university press, New Delhi

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**AUTONOMOUS****CIVIL ENGINEERING**

II B.Tech. II-Sem

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**(A0106104) HYDRAULICS AND HYRAULIC MACHINERY****Course Objectives:**

- Hydraulic engineering principles and methods are essential in the education of civil and environmental engineers. They are needed to estimate the quantity of water present in or conveyed by natural and engineered water systems (rivers, channels, etc). The course will consequently address the fundamentals of flow through open channels, dimensional analysis; Hydraulic machines such as flow through turbines and pumps including their performance characteristics and design aspects.

**Course Outcomes:**

- Understand the various types of open channel flow
- Determine cross sections of different types of channels
- Understand the creation of hydraulic jumps and its advantages
- Apply the dimensional analysis on hydraulic engineering problems
- Understand the behavior of turbines and pumps
- Determine the parameters of turbines and pumps
- Determine the performance of turbines and pumps under different operating conditions.

**UNIT – I**

**OPEN CHANNEL FLOW:** Types of flows - Type of channels – Velocity distribution – Energy and momentum correction factors – Chezy's and Manning's for uniform flow – Most Economical sections. Critical flow: Specific energy-critical depth – computation of critical depth – critical sub-critical and super critical flows. Dynamic equation for G.V.F, Slopes, surface profiles, R.V.F – Hydraulic jump, energy dissipation.

**UNIT – II**

**WATER HAMMER IN PIPES:** Definition - Equation for pressure rise due to gradual closure of valves – Equation for pressure due to sudden closure of valves in rigid & elastic pipes, problems – Surge tanks, their functions and types.

**UNIT - III**

**HYDRAULIC SIMILITUDE:** Dimensional analysis-Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations.

**UNIT – IV**

**BASICS OF TURBO MACHINERY:** Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Applications to radial flow turbines.

**UNIT - V**

**HYDRAULIC TURBINES:** Layout of a typical Hydropower installation – Heads and efficiencies-classification of turbines-pelton wheel-Francis turbine-Kaplan turbine-working, working proportions, velocity diagram, work done and efficiency - draft tube – theory and function efficiency. Governing of turbines-surge tanks-unit and specific turbines-unit speed-unit quantity-unit power-specific speed performance characteristics-geometric similarity-cavitation. (Basic concepts only)

**UNIT – VI**

**CENTRAIFUGAL-PUMPS:** Pump installation details-classification-work done- Manometric head-minimum starting speed-losses and efficiencies-specific speed multistage pumps-pumps in parallel- performance of pumps-characteristic curves- NPSH-cavitation.

**TEXT BOOKS:**

- A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) Ltd., New Delhi
- Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard book house.

**REFERENCES :**

- Elements of Open channel flow by Ranga Raju, Tata Mc.Graw Hill, Publications.
- Fluid mechanics and fluid machines by Rajput, S.Chand &Co.
- Open Channel flow by V.T.Chow, Mc.Graw Hill book company.
- Hydraulic Machines by Banga & Sharma Khanna Publishers.
- Open Channel flow by K,Subramanya . Tata Mc.Grawhill Publishers
- Fluid Mechanics & Fluid Power Engineering by D.S. Kumar Kataria & Sons.
- Hydraulics, Fluid Mechanics and Fluid Machines by S Ramamrutham, Dhanapat Rai Publishing Company

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**(A0107104) STRUCTURAL ANALYSIS – I****Course Objectives:**

- The course objective of this subject consist of Analysis of fixed & continuous beams with differing loading and support settlements, with slope deflection method, theorem of three moments, moment distribution method. Analysis of rolling loads, influences line diagrams.

**Course Outcomes:**

- Graduates will develop the analysis knowledge
- An ability to analyze beams to determining the reactions, moments and drawing the shear force & bending moment diagram, for different types of beams & loadings

**UNIT – I**

**FIXED BEAMS** – Introduction to statically indeterminate beams with U.D. load central point load, eccentric point load. Number of point loads, uniformly varying load, couple and combination of loads shear force and Bending moment diagrams-Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

**UNIT – II**

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

**UNIT-III**

**SLOPE-DEFLECTION METHOD:** Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

**UNIT – IV**

**MOMENT DISTRIBUTION METHOD:** Introduction, application to continuous beams with and without settlement of supports

**UNIT – V**

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

**UNIT -VI**

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

**TEXT BOOKS:**

- Analysis of Structures-Vol I & Vol II by V.N. Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.
- Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi
- Basic structural Analysis by C.S. Reddy, Tata Mcgrawhill, New Delhi

**REFERENCES:**

- Mechanics of Structures by S.B.Junnarkar, Charotar Publishing House, Anand, Gujrat
- Theory of Structures by Gupta, Pandit & Gupta; Tat Mc.Graw – Hill Publishing Co.Ltd., New Delhi.
- Theory of Structures by R.S. Khurmi, S. Chand Publishers
- Strength of Materials and Mechanics of Structures- by B.C.Punmia, Khanna Publications, New Delhi.
- Introduction to structural analysis by B.D. Nautiyal, New age international publishers, New Delhi
- Structural Analysis by V.D.Prasad Galgotia publications, 2nd Editions.
- Comprehensive Structural Analysis-Vol.I&2 by Dr. R. Vaidyanathan & Dr. P.Perumal- Laxmi publications pvt. Ltd., New Delhi

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### (A0108104) BUILDING PLANNING AND DRAWING

#### Course Objectives:

- The course objective covers the building bye laws, Residential buildings, public buildings, sign conventions, residential building plans

#### Course Outcomes:

- Able to understand the building bye laws of the districts and states
- Standard dimensions of the residential buildings and public buildings
- Preparation of various types of residential building drawings

### PART-A

**UNIT – I : Building Byelaws and Regulations:** Introduction – Terminology – Objectives of building byelaws – Floor area ratio (FAR) – Floor space Index (FSI) – Principles underlying building byelaws – classification of bye buildings – Open space requirements – built up area limitations – Height of Buildings – Wall thickness – lighting and ventilation requirement.

**UNIT – II : Residential Buildings:** Minimum standards for various parts of buildings – requirements of different rooms and their grouping – characteristics of various types of residential buildings.

**UNIT – III : Public Buildings And CPM :** Planning of Educational institutions, hospitals, dispensaries, Office buildings, banks, industrial buildings, hotels and motels, buildings for recreation.

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

### PART-B

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

**UNIT – V : DOORS WINDOWS, VENTILATORS AND ROOFS:** Panalled Door – paneled and glazed door, glazed windows – paneled windows – Swing ventilator – Fixed ventilator-Couple roof – Collar roof – Kind Post truss – Queen post truss.

**UNIT – VI :** Given line diagram with specification to draw, plan, sections section and elevation

**Note:** Final examination pattern: First question compulsory for 14 marks from unit I to VI, Three 8 marks questions from unit I to IV & one 32 marks question from unit V to VI has to be answered by student. The duration of the exam will be 4 hours

#### TEXT BOOKS:

- PERT and CPM – Project planning and control with by Dr.B.C.Punmia & Khandelwal – Laxmi publications.
- Building Planning & Drawing by Dr N. Kumaraswamy

#### REFERENCE:

- Building by laws bye state and Central Governments and Municipal corporations.
- ‘A’ Series & ‘B’ Series of JNTU Engineering College, Anantapur
- Construction Planning, Equipment and methods by R.L. Peurifoy etal. – Tata Mc. Graw Hill Publications.

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**(A0010103) ENVIRONMENTAL STUDIES**

(Common to EEE,ECE,EIE,ME,CIVIL,CSE,IT)

**Course Objectives:**

- To create the awareness about the environment and surroundings.
- Creating awareness about abundantly available renewable energy like solar, wind, tidal and geo-thermal energy.

**Course Outcomes:**

Knowing about the actual concepts of environment

- Conservation of biodiversity, Sustainability of utilization of resources
- Practical approach of view by self observation and practice, Applications of solar radiation and non-conventional sources of energy and environmental degradation due construction of hydro electric power projects
- Significance of ecosystem and ecological success can be utilized in protection of natural ecosystems
- Knowing about the values of biodiversity and importance of conservation of biodiversity and threatening factors for loss of biodiversity.
- Protecting of our natural environment from pollution and methods for preventing of pollution, The methods of disposal of solid wastages and precautions to be taken in the period of natural calamities
- Effect of economy of the nation due to population explosion and some of the diseases and preventions can be known from human population and environment
- Urbanization, energy crisis, social issues like women and children welfare and environmental protection laws will give us an idea towards protection of environment

**UNIT-I**

**Introduction of Environmental Studies-Natural Resources:** Definition, The Global environment and its segments; Structure and composition of atmosphere, hydrosphere, lithosphere and biosphere Scope and Importance of Environmental Studies – Need for Public Awareness. Renewable and non-renewable resources – Natural resources and associated problems – Forest resources: Introduction –deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources :Introduction– Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Introduction, environmental effects of extracting and using mineral resources, case studies. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. - Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

**UNIT – II**

**Ecosystems:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem:

- Forest ecosystem.
- Grassland ecosystem.
- Desert ecosystem.
- Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**UNIT – III**

**Biodiversity and its conservation:** Introduction - Definition: genetic, species and ecosystem diversity. - Biogeographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, National and local levels. - India as a mega diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts. - Endangered and endemic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.



**CIVIL ENGINEERING****UNIT – IV**

**Environmental Pollution:** Definition, Cause, effects and control measures of :

- a) Air pollution
- b) Water pollution
- c) Soil pollution
- d) Marine pollution
- e) Noise pollution
- f) Thermal pollution
- g) Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

**UNIT-V**

**Social Issues and the Environment:** From Unsustainable to Sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, and watershed management -Resettlement and rehabilitation of people; its problems and concerns. Case Studies -Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. -Wasteland reclamation. -Consumerism and waste products. -Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

**UNIT-VI**

**Human Population and the Environment:** Population growth, variation among nations. Population explosion - Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. ,Infectious diseases,-Tuber colossi,cancer,Water Borne Diseases-Malaria,Diheria -Women and Child Welfare. - Role of information Technology in Environment and human health. -Case Studies.

**TEXT BOOK:**

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.
3. A Basic Course in environmental Studies by S.Deswal and A.Deswal ,Dhanpat Rai & Co

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**CIVIL ENGINEERING**

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**(A0009103) CORPORATE MANAGEMENT SKILLS**  
(AUDIT COURSE)

**Course Objectives:**

- Provides knowledge & skills on communication (verbal & non verbal)

**Course Outcomes:**

- Able to perform better way in personnel interviews and presentations.

**UNIT-I**

**Concept of Communication** – Significance, Scope and functions of Business Communication – Process and dimensions of communication – Essentials of good communication – Channels of communication – Formal, informal communication – Upward, Downward, Horizontal communication – Grapevine Phenomenon.

**UNIT-II**

**Types of communication: Verbal – Oral Communication:** Advantages and limitations of oral communication, written communication – Characteristics, significance, advantages & Limitations of written communication.

**UNIT-III**

**Non verbal Communication:** Sign language – Body language – Kinesics – Proxemics – Time language and Haptics: Touch language.

**UNIT-IV**

**Interpersonal communication** – Interpersonal communication – Communication models: Exchange theory – Johari window – Transactional analysis, Communication styles.

**UNIT-V**

**Managing Motivation** to Influence Interpersonal communication – Inter-personal perception – Role of emotion in interpersonal communication.

**UNIT-VI**

**Barriers to communication:** Types of barriers – Technological – Socio-Psychological barriers – Overcoming barriers. Listening – Types of listening – Tips for effective listening..

**REFERENCES:**

1. Business Communication, Meenakshi Raman, Oxford University Press.
2. Business Communication, Raymond V.Lesikar, Neeraja Pandit et al.,TMH
3. English for Business Communication, Dr.T.M Farhatulla, Prism books Pvt. Ltd.
4. Business Communications,Hudson,5/e,Jaico Publications
5. Business communication for managers, Penrose, Raspbery, Myers, Cengage
6. The Skills of Communication, Bills Scot, Gower publishing company Limited, London.
7. Effective Communication, Harward Business School, Harward Business Review No.1214.
8. Essentials of Business Communication, Rajendra Pal, JS.Korlahhi, S.Chand



**CIVIL ENGINEERING**

II B.Tech.II-Sem

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**(A0194104) SURVEYING LAB – II****Course Objectives:**

- Provides skills and knowledge in using Theodolite, surveying, tacheometer surveying, Total station surveying

**Course Outcomes:**

- Imparting knowledge in Surveying mainly in using Theodolite, Tacheometer and Total Station.
- Provides knowledge in various areas of Surveying namely Tacheometric Surveying, Trigonometric Surveying and Curve Setting.

**LIST OF EXERCISES:**

1. Trigonometric Leveling - Heights and distance problem (Two Exercises)
2. Heights and distance using Principles of tacheometric surveying (Two Exercises)
3. Curve setting – different methods. (Two Exercises)
4. Setting out works for buildings & pipe lines.
5. Determine of area using total station
6. Traversing using total station
7. Contouring using total station
8. Determination of remote height using total station
9. Stake-out using total station
10. Distance, gradient, Diff., height between two inaccessible points using total stations
11. Learning the use of GPS
12. Learning the use of DGPS

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**(A0193103) FLUID MECHANICS, HYDRAULICS AND HYDRAULIC MACHINERY LAB****Course Objectives:**

- Provides practical knowledge in fluid mechanics concepts
- Provides practical knowledge in fluid machines

**Course Outcomes:**

- Able to use different instruments in the lab
- Understanding in fluid mechanics & fluid machines concepts reinforcing theoretical concepts

**LIST OF EXPERIMENTS:**

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

**LIST OF EQUIPMENT:**

1. Venturimeter setup.
2. Orifice meter setup.
3. Small orifice setup.
4. External mouthpiece setup.
5. Rectangular and Triangular notch setups.
6. Friction factor test setup.
7. Bernoulli's theorem setup.
8. Impact of jets.
9. Hydraulic jump test setup.
10. Pelton wheel and Francis turbines.
11. Centrifugal and Reciprocating pumps.

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**(A0195104) CONSTRUCTION MATERIALS TESTING LAB.****Course Objectives:**

- Provides knowledge in testing on cement, fine & coarse aggregate

**Course Outcomes:**

- An ability to do tests on cement, fine & coarse aggregate so that they can idea in quality control department.

**TESTS ON CONSTRUCTION MATERIALS LIKE CEMENT, FINE AND COARSE AGGREGATE:**

1. Fineness of cement(By dry-sieving method)
2. Standard consistency of cement paste.
3. Initial and final setting of cement.
4. Soundness of cement(By Lechatlier method)
5. Specific gravity of cement
6. Compressive strength of cement
7. Tests on Fine Aggregate
  - a) Sieve analysis – finding FM value and identifying zone as per code of practice.
  - b) Specific gravity
  - c) Determination of moisture content and silt content.
8. Tests on coarse aggregate
  - a) Sieve analysis
  - b) Determination of flakiness and elongation index
  - c) Specific gravity and bulk densities.
  - d) Determination of crushing value, impact value and abrasion value

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**(A0013105) MANAGERIAL ECONOMICS & FINANCIAL ACCOUNTING****Course Objectives:**

- Collect some information regarding economic growth & the basic principles of MEFA and current business environment underlying in business decision making.

**Course Outcomes:**

- It is to occupy managerial positions in future to develop their versatile and dynamic personality and understanding of business and industry.
- It requires that they should have cost effective and utility oriented approach in the real situations of the work.
- It will enable them to produce maximum quantity of the required product at minimum cost.
- Knowledge of accountancy will help them in effective supervision; financial analysis will assist them in assessing their managerial worth in terms of profitability, operational efficiency, financial soundness and deciding effective future line of action.

**UNIT I: Introduction to Managerial Economics:**

Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

**UNIT II: Elasticity of Demand:** Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

**UNIT III: Business & New Economic Environment:** Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.

**UNIT IV: Capital and Capital Budgeting:** Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance. Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

**UNIT V: Introduction to 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 VI: Financial Analysis through ratios:** Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

**TEXT BOOKS:**

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

**REFERENCES:**

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.
5. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age

**International Space Publications.**

1. Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson.
2. Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI.
3. Raghunatha Reddy & Narasimhachary: Managerial Economics & Financial Analysis, Scitech.
4. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas.
5. Truet and Truet: Managerial Economics: Analysis, Problems and Cases, Wiley.
6. Dwivedi: Managerial Economics, 6th Ed., Vikas.

**Codes/Tables: Present Value Tables need to be permitted into the examinations Hall.**

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**(A0109105) DESIGN OF REINFORCED CONCRETE STRUCTURES****Course Objectives:**

- For any construction of a Civil Engg., structure such as a building or a bridge or a dam the knowledge of application of reinforced cement concrete (RCC) is very essential. This course provides the knowledge of different design methods of RCC Beams, Columns, Slabs etc., using respective IS 456 – 2000, IS 875

**Course Outcomes:**

- Knowledge in selecting loading pattern based on the type structure and its location.
- Able to design any RCC element or structure.
- Able to understand the RCC drawings and also check the reinforcement details in construction.
- Able to use the IS Codes

**UNIT –I :** Brief Introduction of working stress, ultimate load, and limit state design as per recommendation of IS 456 – 2000, working stress: elastic theory, design constants; singly and doubly reinforced beam. Limit State Design: Concepts, Characteristic loads, Characteristic strength, Partial load and safety factors, Assumptions, stress - block parameters.

**UNIT –II : Beams:** Limit state of collapse for singly reinforced, doubly reinforced, T beam, simply supported and continuous beams and detailing.

**UNIT –III : Columns:** Design of Short and Long columns subjected to axial loads, uniaxial bending and biaxial bending.

**UNIT –IV : Footings:** Design of isolated, square, and rectangular, combined and grillage footing.

**UNIT – V : Slabs:** Design of Two-way slabs, one way slab, and continuous slab and introduction to flat slab theory only Using I S Coefficients.

**UNIT –VI : Serviceability:** Limit state design for serviceability for deflection and cracking

**NOTE:** All the designs to be taught in Limit State Method. IS 456 – 2000 is permitted for examination.

**TEXT BOOKS:**

- Reinforced concrete design by S.Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.
- Fundamentals of reinforced concrete by N.C. Sinha and S.K Roy, S. Chand publishers.
- Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishres, New Delhi.
- Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

**REFERENCES:**

- Fundamentals of Reinforced concrete design by M.L. Gambhir, Printice Hall of India Private Ltd., New Delhi.
- Reinforced concrete structural elements – behaviour, Analysis and design by P.Purushotham, Tata Mc.Graw-Hill, 1994.
- Reinforced concrete structures, Vol.1, by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd.New Delhi
- Reinforced concrete structures – I.C. Syal & A.K.Goel, S.Chand Publishers.
- Limit state designed of reinforced concrete – P.C.Varghese, Printice Hall of India, New Delhi.

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### (A0110105) WATER SUPPLY & TREATMENT

#### Course Objectives:

- Civil Engineers must have to meet the basic amenities of public.
- This is one of such course which motivates the students to learn different concepts of public water supply, water quality & quantity and also different methods of purification for the water which is bad in quality for drinking
- They can also learn how to distribute treated water to the communities by maintaining sufficient requirement and also can be able to design it according the standards using different principles of hydraulics

#### Course Outcomes:

- Can be able to forecast the water demand according to population
- Can be able to design the distribution network using hydraulics
- Can be able to adopt suitable treatment technology to treat the unfit drinking water

**UNIT-I: Introduction:** Necessity and importance of water works, Population forecasts, design period – water demand – factors affecting – fluctuations – fire demand – water quality and testing – drinking water standards - Waterborne diseases - Comparison from quality and quantity and other considerations

**UNIT II: Water Supply Sources:** Surface, Sub-surface, and Ground Waters – Hydrology and Impounded Storage Requirements –Mass–Inflow Curve, Hydraulics of Ground Water Flow – Estimating Yields of Wells by Steady State Methods (without derivation) – Intake Structures for Different Sources – River, Canal, Lake, Reservoir, Wells and Infiltration Galleries – Construction, Rain water harvesting.

**UNIT III: Water Transmission Systems:** Gravity and Pressure Systems – Hydraulics and Design of Pressure Pipes – Analytical Methods and Nomograms – Series and Parallel Pipes - Different Materials of Pipes - Selections and Class of Pipes – Laying, Jointing and Testing of Commonly used Pipes – Appurtenances of Pipes – Pumps and their Selections – Pumping Stations - Automatic Controls.

**UNIT IV: Water Treatment:** Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation-flocculation clarifier design – coagulants – feeding arrangements

**UNIT V- Filtration and Chlorination:** Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation comparison of filters – disinfection – theory of chlorination, chlorine demand, and other disinfection practices- Miscellaneous treatment methods.

**UNIT VI: Water Distribution Network Analysis :** Distribution systems – Requirements, Layout of Water distribution systems - Design procedures- method of sections, Hardy Cross and equivalent pipe methods service reservoirs – Operation and Maintenance of Distribution Systems – Leak Detection, Corrosion Control and Langelier Index, and Lining of Pipes – Storage Reservoirs – Types, Functions, Location, and Capacity – House Connections and Appurtenances

#### TEXT BOOKS:

1. Raju, B.S.N., “Water Supply and Waste Water Engineering”, Tata McGraw-Hill Book Co., New Delhi, 1995.
2. Water Supply Engineering, Vol. 1, waste water Engineering, Vol. II, B.C.Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi
3. Elements of environmental engineering by K.N. Duggal, S. Chand Publishers.
4. Water supply and sanitary Engineering by S.A.Garg,
5. Birdie, G.S., and Birdie, J.S., “Water Supply and Sanitary Engineering”, 8th Edn., Dhanpat Rai and Sons Ltd., 1997.

#### REFERENCES:

1. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr.
2. Water and Waste Water Technology by Steel
3. Introduction to Environmental Engineering by Mackenzie, Devis and David.A.Cornwell, TMH Publications, New Delhi.

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**(A0111105) WATER RESOURCES ENGINEERING-I****Course Objectives:**

- A Civil Engineer requires complete understanding of hydrological cycle so that harnessing of water in various forms will be justified. This course discusses some basic topics from hydrology such as techniques for measuring the different parameters involved in a hydrological cycle, ground water hydrology, well hydraulics, and complete overview of irrigation and water application methods, open channel flow and how to design different water distribution networks.

**Course Outcomes:**

- Understand the water cycle occurs in nature
- Accountability of various abstractions like Rainfall, evaporation & transportation
- Aquifer nature at different locations
- Soil-water-plant relationship for efficient irrigation
- Canal distribution network design

**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. Runoff-components of runoff, factors affecting runoff, 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**

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

**UNIT-V**

**IRRIGATION:** Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, Indian agricultural soils, methods of improving soil fertility, preparation of land for Irrigation. Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture constants, consumptive use, estimation of consumptive use, Duty and delta, factors affecting duty, depth and frequency of Irrigation, irrigation efficiencies.

**UNIT-VI**

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

**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, Delhi

**REFERENCES:**

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
5. Applied Hydrology by Ven Te Chow, David R.maidment and Larry W.Mays, The Tata Mcgraw Hill Edition, New Delhi

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**(A0112105) STRUCTURAL ANALYSIS – II****Course Objectives:**

- Analysis of beams and portal frame by kani's method, moment distribution, stiffness & flexible, cantilever methods. Analysis of two & three hinged arches

**Course Outcomes:**

- An ability to analyze beams & frames to determine the reactions, moments and drawing the shear force & bending moment diagram, for different methods.
- An ability to analyze two & three hinged arches to determine the reactions, moments and drawing the shear force & bending moment diagram, for

**UNIT I**

**ARCHES:** Three hinged arches, Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature.

**UNIT – II**

**TWO HINGED ARCHES:** Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, – fixed arches – (No Problems).

**UNIT – III**

**MOMENT DISTRIBUTION METHOD :** Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports – storey portal frames – including Sway-Substitute frame analysis by two cycle.

**UNIT – IV**

**KANI'S METHOD:** Basic concepts- Analysis of continuous beams – including settlement of supports and single bay portal frames with out side sway and with side sway by Kani's method.

**UNIT – V**

Approximate method of structural analysis, application to building frames. (i) Portal method (ii) Cantilever method.(Two span or two bays)

**UNIT-VI**

**STIFFNESS AND FLEXIBILITY METHOD:** Introduction, application to continuous beams including support settlements

**TEXT BOOKS:**

1. Analysis of Structures – Vol. I & 2 by Bhavikathi, 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

**REFERENCES:**

1. Structural Analysis (Matrix Approach) by Pundit and Gupta – Tata Mc.Graw Hill publishers.
2. Theory of structures by Ramamuratham
3. Structural Analysis by C.S. Reddy, Tata McGraw-Hill, New Delhi
4. Structural Analysis(Level – 5) – By SR Mangalagiri – Longman Group Ltd ( Longman Technical Series –Construction and Civil Engineering)



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**(A0113105) ENGINEERING GEOLOGY****Course Objectives:**

- Provides knowledge about weathering process, agents and effect on rocks.
- Provide knowledge about various minerals, rocks and their properties and their identification methods.
- Provide knowledge about various geological structures, geophysical methods, earthquakes.
- Provide knowledge about effect of geology of site in selection & construction of dams, tunnels.

**Course Outcomes:**

- Understands the role of geology in civil engineering.
- Selects the suitable rock for construction
- Can be able to decide the suitability of site based on geology for dam or tunnel and provides remedial measures if not suitable.

**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 OF ROCKS:** Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like “Granite”

**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. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following 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, Chrochite, 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 and textures of Igneous. Sedimentary and Metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

**UNIT IV:**

**STRUCTURAL GEOLOGY:** Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults and unconformities, and joints – their important types. Their importance In situ and drift soils, common types of soils, their origin and occurrence in India

**UNIT V:**

**EARTH QUAKE & LAND SLIDES:** Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Land slides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of earth quakes and land slides.

**GEOPHYSICAL STUDIES:** Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc.

**CIVIL ENGINEERING****UNIT VI:**

**GEOLOGY OF DAMS AND RESERVOIRS:** Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factor's Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs.

**TUNNELS:** Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations. Structural and ground water in tunneling over break and lining in tunnels.

**TEXT BOOKS:**

1. Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005
2. Engineering Geology by D.Venkata Reddy, Vikas Publications, New Delhi.

**REFERENCES:**

1. Engineerring geology by Prabin singh
2. F.G. Bell, Fundamental of Engineering Geology Butterworths, Publications, New Delhi, 1992
3. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution,
4. Engineering Geology by Mukarjee, World Press.
5. Foundations of Engineering Geology by Tony Waltham, Special Indian Edition, CRC Press New Delhi.

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**(A0114105) CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT****(AUDIT COURSE)****Course Objectives:**

- The course objective of covers the construction organization and management, site set up and day to day work, planning and programming.

**Course Outcomes:**

- Preparation of construction plans
- Basic requirements of new construction site
- Responsibilities of staff members on particular project

**UNIT I**

**Construction Organization And Its Management:** Introduction-Objective of Building construction organization-Structure of Organization-communication and co-ordination of various Departments-Function of Each Department-Training to the staff-Meetings-Appreciation of work-Extra curricular Activities-Future prospects.

**UNIT II**

**Engineering Department And its Management:** Introduction-objective and scope-Department structure-Function of Individual Divisions-Role and Responsibilities of chief Engineer-Reporting and Meetings-Training Programs

**UNIT III**

**Site-Set up And Day to Day working:** Introduction-General site Rules-Responsibilities of site staff, store keeper, supervisor, junior Engineer, project Engineer-Submission of Reports to the Head office-Records to be Maintained at site-How to keep the site office stage work, Requirement of site office-Site Rules for Discipline-Basic Facilities Required on site-Important points to be considered at site.

**UNIT IV**

**Guide Lines to start New Site:** Introduction-Basic Requirements to start new site-Bhoomi pooja ceremony-List of stationary and Material Required to start a New site-Collection of Documents and Drawings from various Authorities.

**Preparation of site:-**Site clearing and levelling-plot Boundaries-contour survey-Demarcation by Theodolite survey-contour survey-planning for approach roads and temporary structures/water storage and other structures-watchmen's-cabin-site office and store-water arrangement-Electricity arrangement-compound walls-fencing and security fencing-checking of proposed layout with Actual boundaries-temporary water storage tank

**UNIT V**

**Planning and Programming(of construction Activities):** Introduction-construction planning of project material schedule,labour schedule, finance or cash flow schedule-use of advance planning and programming-Methods of preparing construction schedule C.P.M,P.E.R.T,Bar Chart.

**UNIT VI**

**Importance of consultants(Role in planning and Execution):**Introduction-Role and Responsibilities of various consultants such as Architect, structural consultant-plumbing consultant-Electrical consultant-Road work ,Water Proofing, Land scape,Swimming pool work consultant.

**TEXT BOOK:**

1. Practical Building construction and its management by Sandeep Mantri :New Delhi

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**(A0093105) PROFESSIONAL COMMUNICATION AND SOFT SKILLS LAB ( PROS LAB)**

(Common to all Branches)

**Introduction**

The **Professional Communication and Soft Skills Lab** has been introduced at the III B. Tech level to navigate the students towards the appropriate career orientation. At this stage it is imperative for the student to prepare for the ever growing competition in the job market. In this scenario, the student needs to improve his/her Communication and soft skills in an effective manner to cope up the global trends.

**Course Objective:**

Keeping in mind the previous exposure of the student to English, this lab focuses on improving the student's proficiency in English at all levels. The lab intends to train students to use language effectively, to participate in group discussions, to help them face interviews, and sharpen public speaking skills and enhance the confidence of the student by exposing him/her to various situations and contexts which he/she would face in his/her career.

**Syllabus**

The following modules are prescribed for the Professional Communication and Soft Skills Lab.

**Week –I Professional Spirit**

- 1 Motivation & Self Esteem - Questionnaire on self analysis
- 2 Activity- G.D on Personal goals and career objectives
- 3 Case Study – Profile of a successful person

**Week –II Concept of Communication -I**

1. Principles – barriers - Strategies -Analysis through video clipping
2. Activity- Elevator pitch (Tell me about yourself )
3. Reading Comprehension- 1
4. Case study : news reviews

**Week –III Concept of Communication -II**

1. Non verbal communication – kinesics – paralinguistic elements - Analysis through video clipping
2. Activity- Elevator pitch (Tell me about yourself)
3. Vocabulary: idioms & phrases

**Week –IV Concept of Communication -III**

- 1 Listening Skills – ROAR Technique – Chinese Pictograph
- 2 Activity- Debate with analysis on Non verbal cues, Gestures & postures
- 3 Reading Comprehension-2
- 4 Case study : TV Interviews/ Movie

**Week –V Professional Communication -I**

1. Group Discussion- Modalities, Process and evaluation
2. Activity- Group Discussion
3. Vocabulary – Foreign –Derived words

**Week –VI Professional Communication -II**

- 1 Writing Skills –Letters, Emails & Resume Writing
- 2 Activity- Letter writing and Resume Writing practice
- 3 Reading Comprehension-3
- 4 Analysis of Sample Letters / Memos/ Resume s

**CIVIL ENGINEERING****Week –VII Job Skills I**

- HR Interview Strategies, Questions with analysis - Analysis through video clippings(Typical HR interviews)
- Vocabulary: Technical Jargon
- Activity- Group Discussion / Debate

**Week –VIII Job Skills II**

- Telephone Interview Strategies - On line interview Tips -Activity- Mock Interview
- Reading Comprehension-4

**Week –IX Job Skills III**

1. Technical Presentation skills
2. Activity- Group Discussion Practice

**Week –X Soft skills I**

- Reading Skills – SQR3 technique – Bloom's Taxonomy
- Technical Presentation Practice - PPTs

**Week –XI Soft skills II**

- Job Etiquettes
- Communication Project Reviews
- Activity- Group Discussion Practice

**Week –XII Soft skills III**

- Team communication
- Mock CAT/ GRE Test
- Activity -Mock Interview

**Minimum Requirements**

The English Language Lab shall have two parts:

The Computer aided Language lab for 60 students with 60 systems, one master console. LAN facility and English Language Skills Lab with movable Chairs and audio aids with a P.A system, a TV, A digital stereo-audio and video system, Camcorder etc.

**Prescribed software:** Department in-built data, K-Van Solutions and Globarena Ltd.

**BOOKS PRESCRIBED:**

1. Cornerstone: Developing Soft Skills by Robert M. Sherfield, Rhonda J. Montgomery and Patricia G. Moody, published by Pearson Education.
2. Resume's and Interviews by M.Ashraf Rizvi, Tata Mc Graw- Hill, 2008

**BOOKS SUGGESTED FOR REFERENCE:**

1. The ACE of Soft Skills by Gopal Ramesh and Mahadevan REamesh, Pearson Education, 2010
2. How to Do Well in GDs and Interviews by Dorling Kindersley ( India ) Pvt. Ltd., Licencees of Pearson Education in South Asia.
3. Technical Writing by Sharon J.Gerson and Steven M.Gerson , published by Pearson Education
4. Professional Presentations by Malcolm Goodale , published by Cambridge University Press.

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**(A0196105) ENGINEERING GEOLOGY LAB****Course Objectives:**

- Provide knowledge in identify the given mineral or rock from its properties
- Provide knowledge in solving structural geology problems and maps

**Course Outcomes:**

- Able to identify the given mineral or rock by conducting the suitable tests.
- Able to solve the given structural geology problem and map

**EXPERIMENTS:**

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic description and identification of rocks referred under theory.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
4. Simple Structural Geology problems.

**LAB EXAMINATION PATTERN:**

1. Description and identification of Six minerals
2. Description and identification of Six Rocks (including igneous, sedimentary and metamorphic rocks)
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.

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**(A0197105) CIVIL ENGINEERING DRAWINGS USING AUTO CAD LAB****Course Objectives:**

- The course objective of this lab consists of learning skill of developing Building, R.C.C, Bridge, Steel & Irrigation Drawings using AutoCAD

**Course Outcomes:**

- Able to draw & visualize various civil engineering drawings using AutoCAD.

1. Drawings: Two Exercises
2. R.C.C Drawings: Two Exercises
3. Bridge Drawings :Two Exercises
4. Steel Drawings :Two Exercises
5. Irrigation Drawings :Two Exercises

**REFERENCE:**

1. Building planning & Drawings by DR.N. Kumara swamy
2. R.C.C Drawings by Krishna murthy
3. Irrigation Drawings by N. Sreenivasulu
4. Design of Minor Irrigation & canal structures by C. Satyanarayana Murthy

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**(A0012105) MANAGEMENT SCIENCE****Course Objectives:**

- Provide knowledge management, CPM, PERT, Issues in organizations

**Course Outcomes:**

- Can be able to employ this management skills in working areas to manage the resources

**UNIT-I : INTRODUCTION TO MANAGEMENT :** Concepts of Management – Nature, Importance and Functions of Management, Taylor’s Scientific Management Theory, Fayol’s Principles of Management, Mayo’s Hawthorne Experiment, Maslow’s Theory of Human Needs, Douglas McGregor’s Theory X and Theory Y, Herzberg’s Two-Factor Theory of Motivation

**UNIT-II : BASIC ISSUES IN ORGANIZATION :** Designing Organic Structures of Organization (Line organization, Line and staff organization, Functional organization, Committee organization, Matrix organization, Virtual organization, Cellular organization, Team structure, Boundary less organization and Departmentation, Leadership Styles, Social responsibilities of Management

**UNIT-III : OPERATIONS MANAGEMENT :** Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Materials Management: Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records - Supply Chain Management, Marketing: Functions of Marketing, Marketing Mix, Marketing Strategies based on Product Life Cycle., Channels of distribution.

**UNIT-IV : HUMAN RESOURCES MANAGEMENT :** Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRM vs. PMIR, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating.

**UNIT-V : PROJECT MANAGEMENT (PERT/CPM) :** Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing (simple problems).

**UNIT-VI : WOMEN ENTREPRENEURSHIP:** Scope of Entrepreneurship among women- Promotional efforts supporting Women Entrepreneurs in India – Opportunities for women entrepreneurs – Challenges/Problems of Women Entrepreneurs – Successful cases of Women Entrepreneurs.

**TEXT BOOK:**

1. Aryasri: Management Science, TMH, New Delhi.

**REFERENCE BOOKS:**

1. Kotler Philip & Keller Kevin Lane: Marketing Mangement 12/e, PHI, 2007
2. Koontz & Weihrich: Essentials of Management, 6/e, TMH, 2007
3. Thomas N.Duening & John M.Ivancevich Management—Principles and Guidelines, Biztantra,2007.
4. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2007.
5. Memoria & S.V.Ganker, Personnel Management, Himalaya, 25/e, 2007
6. Schermerhorn: Management, Wiley, 2007.
7. Parnell: Strategic Management, Biztantra, 2007.
8. L.S.Srinath: PERT/CPM,Affiliated East-West Press, 2007.



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**(A0115106) GEOTECHNICAL ENGINEERING – I****Course Objectives:**

- Provide knowledge about the properties of soil and the soil classification.
- Provide knowledge about the concept and methods of estimation of seepage, concept and calculation of effective stress, determination of vertical stress using different methods
- Provide knowledge compaction, consolidation phenomenon
- Provide knowledge about shear strength of soil

**Course Outcomes:**

- Give an engineering classification of a given soil. Understand the principle of effective stress, and then calculate stresses that influence soil behavior
- Calculate water flow through ground, and understand the effects of seepage on the stability of structures. Determine soil deformation parameters, and calculate settlement magnitude and rate of settlement.
- Appreciate the difference between total and effective stress approaches in soil strength determination, and discriminate between drained and undrained conditions. Specify soil compaction requirements.

**UNIT – I**

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

**UNIT – II**

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

**UNIT –III**

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

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

**UNIT – IV**

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

**UNIT – V**

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

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

**UNIT – VI**

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

**TEXT BOOKS:**

1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt . Ltd, New Delhi
2. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
3. Soil Mechanics and Foundation by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi.
4. Geotechnical Engineering V.N.S.Murthy, CRC Press, Newyork, Special Indian Edition.

**REFERENCES:**

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 Brijendra M.Das, Cengage Publications, New Delhi.
4. Geotechnical Engineering by Purushotham Raj.
5. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.

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### (A0116106) WASTE WATER ENGINEERING

#### Course Objectives:

- Civil Engineers must have to meet the basic amenities of public like proper sewer network.
- This is one of such course encourages the students to learn different concepts of wastewater production, its quality, quantity, distribution and design of sewer network and different methods to treat and dispose of wastewater, so that the effluent will meet the discharge standards.
- This course also provides knowledge on sludge, its characteristics, treatment and safe disposal of sludge

#### Course Outcomes:

- Students can be able to forecast the quantity of sewage per person
- Can be able characterize it
- Can be able to suggest suitable treatment methods to treat wastewater and sludge based on its quality.
- Can be able to design the sewer network using hydraulics and survey

#### UNIT-I

**Sewage Quantity and Characteristics:** Definitions of terms, sources of sewage, domestic and industrial water, D.W.F., storm water runoff, ground water infiltration. Systems of sewerage, design discharge, Sampling procedure, Wastewater analysis, characteristics, Determination and application of physical, chemical and biological characteristics

#### UNIT-II

**Sewer Design & Plumbing Network:** Common materials and shapes, Hydraulic design of sanitary sewers, storm sewers, Laying and jointing of sewers, testing of sewer pipes, Pipe line and fixtures for bathroom and W.C., House drainage, rain water collection system, Manholes, street inlets, flushing devices, domestic sewers – one pipe and two pipe systems, traps, I.C. and other special structures

#### UNIT-III

**Preliminary and Primary Treatments of Sewage:** Principles and Objectives of Sewage Treatment – Operation and Design of Bar Rack and Grit Chamber with Velocity Control Devices – Principles of Primary Treatment and Design of Primary Sedimentation Tank – Disposal of Rackings, Gritty Materials, and Sludge Solids

#### UNIT-IV

**Biological Treatment Processes:** Objectives of Biological Treatment – Path Ways of Decomposition – Aerobic, Anaerobic, and Anoxic Processes – Operation & Design of Conventional Activated Sludge Process with Diffuser and Mechanical Aerators – Process Modifications – Analysis and Design of Trickling Filter – High rate and Standard Rate Filters – Low Cost Waste Water Treatments – Principles and Design of Stabilization Ponds, Oxidation Ponds and Aerated Lagoons

#### UNIT-V

**SLUDGE TREATMENT AND SEWAGE FARMING:** Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks and Imhoff Tanks working principles and design – soak pits, application of sewage on land for agriculture- suitability

#### UNIT-VI

**House Drainage Works:** Sanitary Fittings – One Pipe and Two Pipe Systems - General Layout of House Drainage Works – Street Connection

#### TEXT BOOKS:

1. Steel.E.W.and McGhee, T.J., “Water Supply and Sewerage”, 5th Edn., McGraw Hill International Editions, New York, 1988.
2. Waste water Engineering, Vol. II, B.C.Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi
3. Water supply and sanitary Engineering by S.A.Garg

#### REFERENCE BOOKS:

1. Metcalf and Eddy, Inc., “Waste Water Engineering – Treatment, Disposal and Reuse”, 3rd Edn., McGraw Hill Book Co., N.Y. 1985.
2. Raju, B.S.N., “Water Supply and Waste Water Engineering”, Tata McGraw-Hill Co., New Delhi, 1995
3. Unit operations in Environmental Engineering by R. Elangovan and M.K. Saseetharan, New age International
4. Environmental Engineering by georad.Kiely TMH Publications.
5. Introduction to Environmental Engineering by Mackenzie, Devis and David.A.Cornwell, TMH Publications, New Delhi.

**CIVIL ENGINEERING**

III B.Tech. II-Sem

T C  
3+1\* 4**(A0117106) DESIGN OF STEEL STRUCTURES****Course Objectives:**

- Design principles of steel structures are essential for Civil Engineers for any fabrication of structure such as a Industrial sheds, bridges, trusses etc. This course provides the thorough knowledge of different design specifications of steel structures using respective IS 800 – 2007.

**Course Outcomes:**

- Able to design any welded & riveted connections of beams columns, lacing & battens, plate girder, column base, gusseted base, slab base, gantry girder, truss.

**UNIT - I**

Welded 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**

Tension members 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 – III**

Design of Column Foundations: Design of slab base and gusseted bases. Column bases subjected moment.

**UNIT – VI**

Design of Built up compression members – Design of lacings and batten

**UNIT - V**

Design of Gantry girders.

**UNIT –IV**

Plate Girder: Design consideration – I S Code recommendations Design of plate girder-Welded – Curtailment of flange plates stiffeners – splicings and connections.

**TEXT BOOKS**

- Design of Steel Structures by Ramachandra. Vol – 1, Universities Press. Hyderabad
- Structural Design and Drawing by N.Krishna Raju; University Press, Hyderabad.
- Design of steel structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi

**REFERENCES**

- Comprehensive Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
- Structural design in steel by Sarwar Alam Raz, New Age International Publishers, New Delhi
- Design of Steel Structures by P.Dayaratnam; S. Chand Publishers
- Design of Steel Structures by M.Raghupathi, Tata Mc. Graw-Hill

**IS CODES:**

- IS -800 – 2007
- IS – 875 – Part III
- Steel Tables.

These codes and steel tables are permitted in the examinations.

**CIVIL ENGINEERING**

III B.Tech. II-Sem

T C  
3+1\* 4**(A0118106) WATER RESOURCES ENGINEERING-II****Course Objectives:**

- Practicing design principles of various hydraulic structures is very much essential for a Civil Engineer. This course discusses overview of dams and reservoirs such as types of dams, design and construction methodology of gravity and earthen dams, overview of spillways. Seepage is inevitable when the structure constructed across the water flow. Hence the pressure due to seepage estimated by Bligh's creep theory and Khosla's theories are discussed. In addition to this the design principles of cross drainage works, canal falls are practiced.

**Course Outcomes:**

- Use the knowledge and skills studied previously, especially, on fluid mechanics, hydraulics and hydrology into this course.
- Recognise the different types of hydraulic structures, to understand its purpose and function and to select the most appropriate structure and location for a specific problem.
- Design, to analyse and to proof that the hydraulic structure is safe and economical.
- Broaden skills in team work, communication and planning through small projects.

**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, zones of storage of a reservoir, reservoir yield, estimation of capacity of reservoir using mass curve.

**UNIT-II : GRAVITY & EARTHEN 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, drainage galleries. 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.

**UNIT-III : SPILLWAYS:** types of spillways, design principles of Ogee spillways, types of spillway gates.

**UNIT-IV : DIVERSION HEAD WORKS:** Types of Diversion head works-diversion and storage head works, weirs and barrages, layout of diversion head works, components. Bligh's creep theory, Khosla's theory, determination of uplift pressure, impervious floors using Bligh's and Khosla's theory, exit gradient

**UNIT-V : CANAL STRUCTURES:** types of falls and their location, design principles of Sarda type fall, trapezoidal notch fall and straight glacis fall, principles of design of distributary and head regulators

**UNIT-VI : CROSS DRAINAGE WORKS:** Types of cross drainage works, 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

**REFERENCES:**

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

AUTONOMOUS  
**CIVIL ENGINEERING**

III B.Tech. II-Sem

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3+1*	4

**(A0119106) HIGHWAY ENGINEERING****Course Objectives:**

- The course objective is to get the knowledge about Highway development planning, geometric design, pavement design, intersection design,
- Traffic volume studies

**Course Outcomes:**

- Able to design the pavements
- Collection of the traffic volume on roads
- Able to design of signals at intersections

**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.

**UNIT – II**

**HIGHWAY MATERIALS:** Soil, Aggregate and Bitumen- Tests on aggregates – Aggregate Properties and their Importance- Tests on Bitumen – Bituminous Concrete- Requirements of Design Mix- Marshall's Method of Bituminous Mix design

**UNIT – III****HIGHWAY GEOMETRIC DESIGN:**

Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Superelevation and Extra widening- Design of Transition Curves- Design of Vertical alignment-Gradients- Vertical curves.

**UNIT – IV****FLEXIBLE 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, Triaxial method – Numerical examples

**UNIT – V****RIGID PAVEMENT DESIGN:**

Design of Rigid pavements – Critical load positions - Westergaard's stress equations – computing Radius of Relative stiffness and equivalent radius of resisting section – stresses in rigid pavements – Design of Expansion and contraction joints in CC pavements. Design of Dowel bars and Tie bars.

**UNIT – VI**

**HIGHWAY CONSTRUCTION:**Construction of Earth Roads- Gravel Roads – WBM Roads- Bituminous Pavements- Cement Concrete Roads- Steps in Construction- Reinforced Concrete Pavements – Soil Stabilization – Methods and Objectives- Soil-cement Stabilization and Soil-lime Stabilization.

**TEXT BOOKS:**

1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7<sup>th</sup> edition (2000)

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AUTONOMOUS  
**CIVIL ENGINEERING**

III B.Tech. II-Sem

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3	2

**(A0120106) PRESTRESSED CONCRETE**  
**(AUDIT COURSE)**

**Course Objectives:**

- For certain Structural elements RCC may not provide required strength. One of the alternatives to get the high strength is by using Prestressed concrete. This course discusses methods & systems of pretensioned & posttensioned members, Different systems of prestressing, losses of prestressing members, analysis of section for flexure, design of section for flexure & shear & deflection.

**Course Outcomes:**

- Able to design and test any prestressing or post tensioned members suitable for Civil Engg applications.

**UNIT – I**

**INTRODUCTION:** Historic development – General principles of prestressing pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

**UNIT – II**

I.S.Code 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 – III**

**LOSSES OF PRESTRESS:** Loss of prestress 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, bending of member and frictional losses.

**UNIT – IV**

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

**UNIT – V**

**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 – VI**

**DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS:** Importance of control of deflections – factors influencing deflections – short term deflections of uncracked member's prediction of long term deflections.

**TEXT BOOKS:**

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

**REFERENCE:**

- Prestressed Concrete by Ramamrutham; Dhanpatrai Publications.
- 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.

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AUTONOMOUS

**CIVIL ENGINEERING**

III B.Tech. II-Sem

P	C
3	2

**(A0198106) GEOTECHNICAL ENGINEERING LAB****Course Objectives:**

- Provide hands on experience in using various geotechnical lab equipment
- Provides knowledge in determining the properties of soil using IS standards.

**Course Outcomes:**

- Able to determine the various properties of soil like index properties, coefficient of permeability, consolidation parameters, shear parameter and shear strength and interpret the results for the given soil.

**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 eight experiments may be completed.

**LIST OF EQUIPMENT:**

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and Shrinkage limits
3. Field Density apparatus for
  - a) Core cutter method
  - b) Sand Replacement method
4. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 5.15mm, and 0.075mm.
5. Hydrometer
6. Permeability Apparatus for
  - a) Constant Head test
  - b) Variable Head test
7. Universal Auto compactor for I.S light and heavy compaction tests.
8. Apparatus for CBR test
9. Sampling tubes and sample extractors.
10. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
11. One dimensional consolidation test apparatus with all accessories.
12. Tri-axial cell with provision for accommodating 38 mm dia specimens.
13. Box shear test apparatus
14. Laboratory vane shear apparatus.
15. Hot Air ovens (Range of Temperature 50-150°C)
16. Moisture cans – 2 dozens.
17. Electronic balances of 500 g capacity with 0.01g least count and 5 kg capacity with least count of 1gm
18. Measuring Jars
 

- 1000CC-	6
- 100CC-	4
19. Mercury
 

- 500 g
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20. Rammers
 

- 2
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21. Crow bars
 

- 2
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**TEXT BOOKS:**

1. Soil Testing Lab Manual by K.V.S. Appa Rao & V.C.C.Rao, University Science Press, Laxmi Publication.
2. Soil Testing for Engineers by S.Mittal and J.P.Shukla, Kahna Publishers, New Delhi. Relevant IS Codes.



AUTONOMOUS  
**CIVIL ENGINEERING**

III B.Tech. II-Sem

P	C
3	2

**(A0199106) ENVIRONMENTAL ENGINEERING LAB****Course Objectives:**

- Civil Engineers must be in a position to predict the quality of water, wastewater and sludge/Solid.
- This course motivates the students to learn different experimental techniques to analyze and characterize the water, wastewater and sludge quality from different sources in terms of its physical, chemical and biological parameters by using different chemical, instrumental and analytical techniques.
- They can use the knowledge of physics, chemistry, biology and mathematics to do this lab.

**Course Outcomes:**

- Can be able to analyze the water, wastewater, solid, sludge quality
- Can be able to learn many analytics, experimental techniques of different fields

**Analysis of Water Quality Parameters:-**

1. Determination of pH
2. Taste and odour
3. Determination of Acidity and Alkalinity
4. Determination of Chlorides
5. Determination of Dissolved Oxygen
6. Estimation of Sulphates
7. Estimation of Total Dissolved Solids.
8. Estimation of Conductivity
9. Determination of Turbidity
10. Estimation of Hardness of water by EDTA Titration Method
11. Determination of Available Chlorine in Bleaching Powder, Residual Chlorine, Break Point Chlorination and Chlorine Demand.
12. Optimum Coagulant Dose by Jar Test Apparatus
13. Determination of MPN Index for Coliforms

**Analysis of Wastewater Quality Parameters**

1. Determination of Total solids, settleable solids, dissolved solids and volatile Solids.
2. Determination of BOD and COD
3. Determination of Ammonia–nitrogen and Nitrates.
4. Estimation of Phosphates

**Text Book**

1. Sawyer, N.C., and McCarty, P.L., “Chemistry for Environmental Engineering”, 5th Edn. McGraw-Hill Book Co., New York., 1985.

**Reference Book:**

1. “Standard Methods for the Examination of Water and Waste Water”, APHA-AWWAPCF, 25th Edn., Washington (D.C), 1995



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**AUTONOMOUS****CIVIL ENGINEERING**

III B.Tech. II-Sem

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**(A0181106) CAD LAB****Course Objectives:**

- The course objective of this Lab consists of Analysis & design of fixed beam, continuous beam, plane frame, and space frame, one – way & two – way slabs. Roof truss, isolated column footing. Retaining wall.

**Course Outcomes:**

- From this course student were learning how to create a models, applying loads, boundary conditions, analysis & design.
1. Analysis & design of fixed beam.
  2. Analysis & design of continuous beam
  3. Analysis & design of plane frame.
  4. Analysis and design of space frame
  5. Analysis of roof truss.
  6. Design of one – way slabs.
  7. Design of two – way slabs.
  8. Design of isolated column footing.
  9. Design of retaining wall.
  10. Using STAAD Pro or STRUDS or STRAP etc.

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AUTONOMOUS

**CIVIL ENGINEERING**

IV B.Tech. I-Sem

T	C
3+1*	4

**(A0121107) GEOTECHNICAL ENGINEERING – II****Course Objectives:**

- Provide knowledge in soil exploration methods.
- Provide knowledge about various types of foundations and various bearing capacity equations.
- Provide knowledge about deep & well foundations.
- Learn various slope stability methods

**Course Outcomes:**

- Able to design & execute the soil exploration scheme.
- Able to design & execute the foundation based on soil investigation.
- Able to understand the well foundation construction.
- Able to perform the stability analysis of given slope

**UNIT – I**

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

**UNIT – II**

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

**UNIT – III**

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

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

**UNIT – IV**

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

**UNIT-V**

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

**UNIT –VI**

**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. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi.
3. Soil Mechanics and Foundations by – by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

**REFERENCES:**

1. Das, B.M., - (1999) Principles of Foundation Engineering –6<sup>th</sup> edition (Indian edition) Thomson Engineering
2. Bowles, J.E., (1988) Foundation Analysis and Design – 4<sup>th</sup> Edition, McGraw-Hill Publishing company, Newyork.
3. Analysis and Design of Substructures – Swami Saran, Oxford and IBH Publishing company Pvt Ltd ( 1998 ).
4. Geotechnical Engineering by S. K.Gulhati & Manoj Datta – Tata Mc.Graw Hill Publishing company New Delhi. 2005.
5. Teng, W.C – Foundation Design , Prentice Hall, New Jersey
6. Foundation Engineering by Varghese, P.C., Prentice Hall of India., New Delhi.
7. Geotechnical Engineering by C.Venkataramaiah,

**CIVIL ENGINEERING**

IV B.Tech. I-Sem

T C  
3+1\* 4**(A0122107) ESTIMATION, COSTING AND VALUATION****Course Objectives:**

- Civil Engineer requires sound knowledge about the estimation, costing of any type of structure such as buildings, roads, bridges, dams etc.,
- This course discusses Estimates of Buildings, Earthworks, Reinforcement, valuation of buildings, standard specification of materials

**Course Outcomes:**

- Able to calculate the quantities of the construction materials
- Able to preparation of Rate analysis for different construction materials
- Identification of usage of construction equipments and their daily wages
- Identification of wages(or) Rates for Labours.

**UNIT – I**

**INTRODUCTION :** General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.

**UNIT – II**

**ESTIMATION OF BUILDINGS :** Detailed Estimates of Buildings by using centreline & long wall and short wall method. (single storey with two rooms)

**UNIT – III**

**EARTHWORK ESTIMATION:** Estimation of Earthwork for roads and canals

**UNIT – IV**

**RATE ANALYSIS :** Working out data for various items of work over head and contingent charges.

**UNIT-V**

**REINFORCEMENT ESTIMATION:** Reinforcement bar bending and bar requirement schedules.

**UNIT – VI**

**CONTRACTS AND TENDERS:** Contracts – Types of contracts – Contract Documents – Conditions of contract – Types of Tenders – Requirement of Tendering.

**VALUATION :** Valuation of buildings.

**STANDARDS SPECIFICATIONS:** Standard specifications for different items of building construction.

**TEXT BOOKS**

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.

**CIVIL ENGINEERING**

IV B.Tech. I-Sem

T C  
3+1\* 4**(A0123107) ADVANCED STRUCTURAL DESIGN****Course Objectives:**

- The course objective of this subject consist of Design of retaining wall, cantilever, counter fort, RCC water, circular, rectangle tank, chimeny.

**Course Outcomes:**

- Graduates will develop the designing knowledge
- Able to design the different element which is listed in course.

**UNIT – I**

Design of RCC Retaining walls such as cantilever and counter fort

**UNIT – II**

Design of RCC water tanks, Circular and rectangular types.

**UNIT – III**

Design of steel water tanks

**UNIT - IV**

Introduction to silos concepts of loading and Design.

**UNIT – V**

Introduction to Chimney concept of loading and design

**UNIT – VI**

Introduction to concrete bridges, IRC loading, slab bridges and T - beam bridges design concepts.

**TEXT BOOKS:**

1. Advanced Reinforced concrete structures by Vargheesh, Pranties Hall of India Pvt. Ltd.
2. Design drawing of concrete and steel structures by N.Krishna Raju University Press 2005.
3. Reinforced concrete structures Vol-2 by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

**REFERENCES:**

1. Essentials of Bridge Engineering by D.John son Victor, Oxford and IBM publication Co., Pvt. Ltd.
2. Reinforced concrete design by S.U, Pillai and D.Menon, Tata Mc.Ghrawhill Publishing Company
3. Advanced Reinforced Concrete Design by P.C. Varghese, Prentice Hall India.

**Codes:** Relevant IS: codes and tables are permitted for examination

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**CIVIL ENGINEERING**

IV B.Tech. I-Sem

T	C
3+1*	4

**(A0124107) FINITE ELEMENT METHODS IN CIVIL ENGINEERING****Course Objectives:**

- This is an Introductory course to understand and apply the finite element method for various Civil Engg applications. This course provides to learn different concepts of finite element methods to generate the stiffness matrices for different elements

**Course Outcomes:**

- Able to generate Stiffness matrix for bar element, find shape function for one dimensional element, generate element stiffness and nodal load matrices for 3-node triangular element and four node rectangular elements.
- Formulation of isoparametric elements for 2D analysis -formulation of CST element, 4-noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.
- Formulation of 4-node iso-parametric axis-symmetric element

**UNIT -I**

Introduction: Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.

**UNIT -II**

Principles of Elasticity: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axis-symmetric bodies of revolution with axis-symmetric loading.

**UNIT -III**

One Dimensional FEM : Stiffness matrix for bar element - shape functions for one dimensional elements – one dimensional problems.

**UNIT –IV**

Two Dimensional FEM : 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 .

**UNIT –V**

Generation of element stiffness and nodal load matrices for 3-node triangular element and four node rectangular elements.

**UNIT –VI**

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. Formulation of 4-node iso-parametric axis-symmetric element

**TEXT BOOK:**

1. Finite Elements Methods in Engineering by Tirupati.R. Chandrepatla and Ashok D. Belegundu - Pearson Education Publications.
2. Finite element analysis by S.S. Bhavakatti-New age international publishers
3. Finite element analysis by David V Hutton, Tata Mcgraw Hill, New Delhi

**REFERENCES:**

1. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers.
2. Text book of Finite Element analysis by P.Seshu – Prentice Hall of India.

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**AUTONOMOUS****CIVIL ENGINEERING**

IV B.Tech. I-Sem

T	C
3+1*	4

**(A0125107) GEOINFORMATICS****(ELECTIVE – I)****Course Objectives:**

- This is an introductory course on Remote Sensing and GIS. The main goal of this course is to impart the core principles and basic techniques of Remote sensing and Geographic Information Systems (GIS). The GIS has emerged as a generic tool that has applications touching upon all disciplines as well as all aspects of life. Finally, students can understand the various engineering applications of remote sensing and GIS. The rapid progress and increased visibility of remote sensing and GIS since the 1990s has been made possible by a paradigm shift in computer technology, computer science and software engg., as well as airborne and space observation technologies.

**Course Outcomes:**

- Use of digital photogrammetry in remote sensing.
- The basic physics of remote sensing describing the remote sensing system, The electromagnetic radiation interaction with matter and atmosphere.
- Effect of geometric and radiometric errors on data and their minimization will be discussed.
- Types of satellite orbits, the digital images, their formats, types of sensors, Various fundamental image processing routines
- It is possible to make conventional GIS over the Internet, sharing various data for the use of the whole world.

**UNIT – I**

**INTRODUCTION TO PHOTOGRAMMETRY:** Principle and types of aerial photographs, scales, stereoscopy, ground control, Parallax measurements for height, determinations.

**UNIT – II**

**REMOTE SENSING:** Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. 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, 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.

**UNIT – IV**

**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 – V**

**GIS SPATIAL ANALYSIS:** Introduction, geospatial data analysis, integration and modeling of spatial data, geospatial data analysis methods, database query, geospatial measurements, overlay operations, network analysis, surface analysis, geostatistics, geovisualization,

**UNIT – VI**

**REMOTE SENSING & GIS APPLICATIONS :** Flood management; Reservoir sedimentation; Geomorphology; Monitoring urban growth; Military operations; Watershed management, Satellite surveillance for drought conditions; Estimating forest cover, Water resources management, Land use/Land cover – changes and mapping; Agriculture – crop type mapping, monitoring and damage assessment; Ground Water Targeting, Identification of sites for artificial Recharge structures.

**CIVIL ENGINEERING****TEXT BOOKS:**

- 1 Remote Sensing and GIS by B.Bhatta,Oxford University Press,New Delhi.
- 2 Advanced surveying : Total station GIS and remote sensing – Satheesh Gopi – Pearson publication.
- 3 Geographical Information Science by Narayana Panigrahi, University press,New Delhi
- 4 GIS by Kang – tsung chang, TMH Publications & Co.,
- 5 Principals of Geo physical Information Systems – Peter A Burragh and Rachael Mc Donnell, Oxford Publishers 2004

**REFERENCES:**

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
2. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
3. The GIS book by Korte,cengage publications,New Delhi.
4. Fundamental of GIS by Mechanical designs John Wiley & Sons.
5. Remote sensing and GIS by M.Anji reddy ,B.S.Pubiliications,New Delhi.
6. Remote Sensing and its applications by LRA Narayana University Press 1999.
7. Geoinformation for Development by Zeil/Kienberger (Eds) – Univ.Science Press, New Delh

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**AUTONOMOUS****CIVIL ENGINEERING**

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**(A0126107) WATER RESOURCES SYSTEM PLANNING AND MANAGEMENT**  
**(ELECTIVE – I)**
**Course Objectives:**

- Water resource systems deals with modelling techniques for optimum utilization of the available water resources in a system. This course emphasis on the basics of systems techniques in water resources with illustrative examples, and potential applications to real systems.

**Course Outcomes:**

- Linear programming applications to crop yield optimization, multi reservoir systems
- Dynamic programming applications to crop water allocation, steady state reservoir operating policy and real time operation of irrigation

**UNIT – I**

**INTRODUCTION:** concepts of systems analysis, definition, systems approach to water resources planning and management, role of optimization models, objective function and constraints, types of optimization techniques.

**UNIT – II**

**LINEAR PROGRAMMING –I:** Formulation linear programming models, graphical method, simplex method, application of Linear programming in water resources.

**UNIT – III**

**LINEAR PROGRAMMING – II:** Revised simplex method, duality in linear programming, sensitivity and post optimality analysis.

**UNIT – IV**

**DYNAMIC PROGRAMMING:** Belman's of principles of optimality forward and backward recursive dynamic programming, case of dimensionality, application of dynamic programming for resource allocation.

**UNIT – V**

**SIMULATION:** application of simulation techniques in water resources.

**UNIT – VI**

**WATER RESOURCES MANAGEMENT:** Planning of reservoir system, optimal operation of single reservoir system, allocation of water resources, optimal cropping pattern, conjunctive use of surface and sub-surface water resources.

**TEXT BOOKS:**

- Water Resources System Analysis – Vedula & Mujumdar – Tata Mc.Graw Hill Company Ltd. 2005.
- Water Resources Economics - James & Lee. Oxford Publishers 2005.
- Optimisation technique by S.S.Rao

**REFERENCES:**

- Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003.
- Operations research by P.Sankar Iyer,TMH Publications,New Delhi.
- Operations research by N.Ramanathan,TMH Publications,New Delhi



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3+1\* 4**(A0127107) EARTHQUAKE RESISTANT DESIGN****(ELECTIVE – I)****Course Objectives:**

- The course objective of this subject consist of Introduction to earthquake, terminology, classifications, causes, effects, formulations of single degree of freedom & multy degree of freedom. Design of shear walls.

**Course Outcomes:**

- This course motivates the students to give the knowledge of earth quakes i.e. causes & effects from these ideas they can design the structure by considering the seismic loads to with stands.

**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.

**UNIT – II**

**Introduction to Structural Dynamics**: – Theory of vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Undamped and damped free vibration – Damping – Response to harmonic excitation – Concept of response spectrum.

**UNIT – III**

**Earthquake Analysis** : - Introduction – Rigid base excitation – Formulation of equations of motion for SDOF and MDOF Systems – Earthquake response analysis of single and multi-storyed buildings – Use of response spectra.

**UNIT – IV**

**Multi-Degree of Freedom (MDOF) Systems**: - Formulation of equations of motion – Free vibration – Determination of natural frequencies of vibration and mode shapes – Orthogonal properties of normal modes – Mode superposition method of obtaining response.

**UNIT – V**

**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 method – Displacements and drift requirements – Provisions for torsion.

**UNIT – VI**

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

**TEXT BOOKS:**

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

**REFERENCES:**

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

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

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**(A0128107) BRIDGE ENGINEERING**  
(ELECTIVE – I)

**Course Objectives:**

- The course objective of this subject consist
- Introduction, types of bridges, loadings on bridges, elements of bridges.
- Design of piers, abutments, slab, box culverts & design of T-beam reinforced concrete bridge.

**Course Outcomes:**

- From this course student were learning how the bridges are classified & what loadings are coming on bridges, what are the elements of bridges and designs, so this knowledge helps very much in the practical point of view.

**UNIT I**

**Introduction:** Definitions, components of a bridge, classification, importance and standard specifications.

**UNIT II**

**Investigation for bridge:** Site selection, data drawing, design discharge linear water way, economical span, location of piers and abutments, vertical clearance above HFL, scour depth. Traffic projection, investigation report choice of bridge type.

**UNIT III**

**Standard specification for Road Bridge:** IRC bridge code, determination of dead loads and live loads, wind loads, longitudinal forces, centrifugal forces, horizontal forces due to water current buoyancy effect, earth pressure, temperature effect, deformation stresses, Secondary stresses, erection stresses, seismic forces.

**UNIT IV**

**Culverts:** Design of slab culvert and box culvert.

**UNIT V**

**Design of T- beam reinforced concrete bridges.**

**UNIT VI**

**Design of sub structure:** Design of piers and masonry abutments.

**BOOKS:**

1. Essentials of bridge engineering: D.Johnson Victor
2. Design of concrete bridge: Aswani, Vaziani, Ratwani
3. Concrete bridges: V.K.Raina
4. Bridge Engineering: Ponnuswamy

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**(A0129107) OPEN CHANNEL HYDRAULICS  
(ELECTIVE – I)**
**Course Objectives:**

- This course finds application in the solution of problems related to several aspects of development of surface water resources. Problems in a wide variety of fields, such as the design of hydraulic structures, dispersion of pollutants, overland flow and sediment transport in rivers require the use of principles of open-channel flow.

**Course Outcomes:**

- Student is introduced to open channel flow characteristics including hydraulic jump and transitions.
- Get the knowledge about gradually and rapidly varied open channel flows.
- Student, at the end of the semester will have the abilities to analyse flow characteristics in open channel.

**UNIT-I**

**INTRODUCTION:** Difference between pipe flow and open channel flow, classification of flow, energy equation, momentum equation, kinetic energy and momentum factors.

**UNIT-II**

**UNIFORM FLOW:** Concepts, uniform flow equations, conveyance and hydraulic exponent for uniform flow, design of channels for uniform flow.

**UNIT-III**

**CRITICAL FLOW:** Concept of specific energy, Classification of flow, design of channel, Section factor, Hydraulic exponent for critical flow, critical depth as a flow measurement.

**UNIT-IV**

**GRADUALLY VARIED FLOW:** Concepts, GVF equation, it's different forms, Basic assumptions, Dynamic equation, Characteristics of flow profile and classification. Analysis of flow profiles, Method of singular point and transitional depth, methods of computation, practical problems.

**UNIT-V**

**GVF COMPUTATIONS:** Different methods, direct integration method, Bress's solution, Chow's solution, direct method, standard step method.

**UNIT-VI**

**RAPIDLY VARIED FLOW:** Concepts, hydraulic jump in rectangular channels, classification of jumps, characteristics of jump – length, location and height, Stilling basins, shape type-2 and type-4, Hydraulic jump in - rectangular sloping channels, non-rectangular channels; application of hydraulic jump as energy dissipater. .

**TEXT BOOKS:**

- 1 Rangaraju R G: Flow through open channel, Tata McGraw Hill Publishing Co Ltd, New Delhi
- 2 Subramanya K: Open Channel Hydraulics, Tata McGraw Hill publishing Co Ltd, New Delhi.

**REFERENCE BOOKS:**

- 1 Chow Ven Te: Open Channel Hydraulics, McGraw Hill Book Company, New Delhi
- 2 French: Open Channel Hydraulics, McGraw Hill Book Company, New Delhi
- 3 Modi and Seth: Fluid Mechanics, Standard House, New Delhi
- 4 Henderson: Open Channel Hydraulics, Mr. Millan Publishing Co. Ltd, New Delhi

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**(A0130107) RAILWAYS, DOCKS & HARBOR ENGINEERING**  
(ELECTIVE – II)

**Course Objectives:**

- The course objective covers the geometric design of railway track, stations and yards, tunneling, introduction of harbor engineering

**Course Outcomes:**

- Design of railway tracks
- Student can easily identify the problems in tunneling construction

**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.

**UNIT – II**

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

**UNIT- III**

**STATIONS AND YARDS:** Introduction-purposes of a rail way 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

**UNIT – IV**

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

**UNIT – V**

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

**UNIT – VI**

**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.

**TEXT BOOKS :**

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

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**(A0131107) TRAFFIC ENGINEERING**  
**(ELECTIVE – II )**

**Course Objectives:**

- The course objective covers the traffic characteristics, traffic measurements, Highway capacity, parking studies, Traffic signs and road markings.

**Course Outcomes:**

- How to Collection of traffic volume on roads
- Student can easily indentify the sign boards and markings on the roads

**UNIT-I**

**TRAFFIC CHARACTERISTICS:** Basic characteristics of Traffic- Volume, Speed and Density- Relationship among Traffic parameters.

**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

**UNIT-III**

**PARKING STUDIES:** Types of parking facilities – Onstreet and Off Street Parking Facilities- Parking Studies- Parking Inventory Study – Parking Survey by Patrolling Method- Analysis of Parking Data and parking characteristics-Multi Story Car Parking Facility-Design standards.

**UNIT-IV**

**TRAFFIC CONTROL & REGULATION:** Traffic Problems in Urban areas- Importance of Traffic Control and regulation- Traffic Regulatory Measures- Channelisation

**UNIT-V**

**TRAFFIC SIGNS AND ROAD MARKINGS:** Types of Traffic Signs- cautionary,Regulatory and Informative Signs- Specifications- Pavement markings- Types of Markings – Lane markings and Object markings- Standards and Specifications for Road Markings.

**UNIT-VI**

**HIGHWAY SAFETY:** Problem of Highway Safety – Types of Road accidents- Causes – Engineering Measures to reduce Accidents- Enforcement Measures – Educational Measures- Road Safety Audit- Principles of Road Safety Audit.

**TEXT BOOK:**

1. Traffic Engineering and Transportation planning – LK kadiyali – Khanna publishers.

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**(A0132107) SAFETY ENGINEERING**  
**(ELECTIVE – II)**

**Course Objectives:**

- Safety is the primary requirement in any activity. Especially safety in engineering constructions or in engineering disciplines has a vital role
- This course enables the students to learn methods of hazard Control, types of unsafely ways, their control techniques, Electrical
- Also focuses on alternative methods to handle irradiative and radioactive materials , combustible and non combustible materials
- The students can learns the equipments available for Personal protection and safety management, communication of safety programs etc.

**Course Outcomes:**

- Can learn different ways, methods about safety
- Can be able to supervise and suggest the safety measures to be employed at any activity
- Can be able to communicate the complete details about safety
- Can be able to identify the reason for any accidents

**UNIT I**

Introduction to OSHA - Fundamental Concepts - Hazard Control - Mechanics &amp; Structures

**UNIT II**

Walking &amp; Working Surfaces- Slip, Trip &amp; Fall - Electrical Safety - Lockout / Tagout (LOTO)- Machine Guarding

**UNIT III**

Manual Materials Handling &amp; Ergonomics - Mechanized Materials Handling - Fire Protection &amp; Prevention, Egress -Flammable &amp; Combustible Liquids, Explosives - Heat Stress

**UNIT IV**

Noise &amp; Vibration -Confined Spaces - Chemicals, Hazard Communication (HAZCOM)

**UNIT V**

Personal Protective Equipment (PPE) - Ionizing &amp; Non-ionizing Radiation - Workplace Violence

**UNIT VI**

Safety Training and Communication - Safety Management -Safety Programs

**TEXT BOOK:**

1. Safety and Health for Engineers,2<sup>nd</sup> Ed., by Brauer. John Wiley & Sons, Inc.(2006).

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**(A0133107) GROUND IMPROVEMENT TECHNIQUES**  
**(ELECTIVE – II)**

**Course Objectives:**

- Certain soils does not permit the construction of specific structures on it. The alternative is to improve the strength of the soil by various methods.
- Provide knowledge about various ground improvement techniques like mechanical, chemical, lime stabilization, geotextile, geosynthetics, reinforcing earth, densification of granular & cohesive soils.

**Course Outcomes:**

- Be able to suggest and design the ground improvement technique for a given problem
- Be able to do research in identifying new ground improvement techniques based on latest technology.

**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.

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

**UNIT – III : 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 geo-drains – Stone and lime columns – forced vacuum pre-consolidation- thermal methods.

**UNIT – IV : STABILISATION:** Methods of stabilization-mechanical-cement- lime-bituminous-chemical stabilization with calcium chloride, sodium silicate and gypsum, design of mixtures, construction methods.

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

**GEOSYNTHETICS :** Geotextiles- Types, Functions and applications – geogrids and geomembranes – functions and applications. Tests for geotextile materials

**UNIT – VI : 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

**REFERENCES:**

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

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**(A0134107) AIRPORT ENGINEERING****(ELECTIVE – II)****Course Objectives:**

- The course objective of covers the Air transport, Airport drainage, Helicopters, Air traffic control

**Course Outcomes:**

- Student can learn from this course is how to control airport drainage, characteristics of helicopter, maintenance of pavements.

**UNIT – I**

**AIR TRANSPORT:** General-Different Modes of Transportation-History of Air Transport-Structure and organization of Air Transport-Directorate of civil Aviation-National Airports Authority-International Airports Authority of India-International civil Aviation organization

**UNIT – II**

**AIRPORT CHARACTERISTICS:** –General-Relation between Aircraft and Airports-Influence of Aircraft Design on Runway Length-Requirements of Aircraft types-Airport characteristics.

**UNIT – III**

**AIRPORT PLANNING:** General-Airprt Master plan-Regional planning-Data required before site selection-Airport site selection-surveys for site selection-Drawings to be prepared-Estimation of future Air Traffic needs.

**UNIT – IV**

**RUNWAY DESIGN:**-Runway orientation-Basic Runway length-correction for elevation ,temperature and gradient-Airport classification-Runway Geometric Design.

**UNIT – V**

**AIRPORTCAPACITY & CONFIGURATION:** - Airport capacity-Runway capacity-Gate capacity-Taxiway capacity-Airport configuration-Runway configuration.

**UNIT – VI**

**AIR TRAFFIC CONTROL:** Introduction-Need of Air traffic control –Air Traffic control Network –Air traffic control aids

**TEXT BOOKS:**

1. A Text book of AIRPORT ENGINEERING AND DESIGN-S.K.KHANNA-M.G.ARORA-S.S.JAIN



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**AUTONOMOUS****CIVIL ENGINEERING**

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**(A0135107) ENVIRONMENTAL IMPACT ASSESSMENT & MANAGEMENT**  
**(AUDIT COURSE)**

**Course Objectives:**

- This course motivates the students to learn different concepts on methods to assess the environment quality (Air, water, soil, biota etc.) which is damaged because of different sources
- Provides the important parameters to be considered in assessing environmental quality
- This course imparts certain kind of decision making knowledge in relevance with the project actions-impacts.
- Also focuses on methods of auditing for any project whose actions have several consequences on environmental quality over the proposed area.

**Course Outcomes:**

- Can be able to assess the environmental quality (air, water, soil, biota etc)
- Can learn the different methods to assess the quality and different parameters to be considered in assessing the quality
- Can be able to assess the impact of a project on environment
- Can be able to do auditing for any project or company which has relation with the environment

**UNIT – I : Basic concept of EIA :** Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, participants in EIA process and main stages of EIA process.

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

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

**UNIT-IV : Quality Assessment using EIA:** Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, generalized approach for assessment of Air pollution Impact.

**UNIT –V :** Environmental Evaluation systems, Preparation of Environmental Impact statements.

**UNIT-VI : Case Studies:** Case studies and preparation of Environmental Impact assessment statement for various Industries namely thermal power plants, steel plant, highway and pharmaceutical industries.

**TEXT BOOKS:**

1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad
2. Canter, L.W., " Environmental Impact Assessment ", McGraw Hill, New York, 1996.

**REFERENCES:**

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katania & Sons Publication., New Delhi.
2. Petts, J., " Handbook of Environmental Impact Assessment Vol. I and II ", Blackwell Science, London, 1999.
3. The World Bank Group., " Environmental Assessment Sourcebook Vol. I, II and III ", The World Bank, Washington, 1991.

**CIVIL ENGINEERING**

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**(A0182107) GIS LAB****Course Objectives:**

- In this laboratory students will learn the GIS software capabilities and applications.

**Course Outcomes:**

- Some basics of Software like how to georeference a toposheet (Georeferencing is nothing but a geographic coordinate system is used to assign geographic locations to objects), how to give spatial reference, how to clip the toposheet, how to Projecting a Raster, i.e., a three-dimensional surface in two dimensions involves distortion of some parameter either shape, area, distance, or direction, and various projections cause different kinds of distortion. Practice on the creation of thematic maps and an important study of features estimation will be practiced. Also Some exercises will be practiced on applications of GIS in Water Resources Engg and Transportation Engg.

**SOFTWARE :**

1. Arc GIS 10.0
2. AutoCAD Land Desktop

**EXERCISES:**

1. Digitization of Map/Toposheet
2. Creation of thematic maps.
3. Study of features estimation
4. Creation of TIN file
5. Developing Digital Elevation model
6. Application of GIS in water Resources Engineering
7. Application of GIS in Transportation Engineering.

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**(A0183107) HIGHWAY ENGINEERING LAB****Course Objectives:**

- The course objective of covers the tests on bituminous materials Also covers use of MX Roads software

**Course Outcomes:**

- Students can easily identify the properties of the bituminous material by conducting various tests.
- Able to use the MX Roads software

**I. BITUMINOUS MATERIALS:**

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

**II. Desing of flexible /Rigid pavements by using MX Road Soft ware****III Use of Project Management Software PRIMAVERA or Others****LIST OF EQUIPMENT:**

1. Bitumen penetration test setup.
2. Bitumen Ductility test setup.
3. MX – Roads Software
4. PRIMAVERA or Other software
5. Bitumen Ductility test setup.
6. MX – Roads Software
7. PRIMAVERA or Other software

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**(A0136108) DESIGN AND DRAWING OF IRRIGATION STRUCTURES****Course Objectives:**

- Irrigation structures play a vital role in controlling and diverting water flows in the canals and reservoirs. In government sectors Engineer's should have complete understanding about various design and drawing specifications of irrigation structures like canal regulator, aqueduct, tank sluice and surplus weir. Whenever the available natural ground slope is steeper than the designed bed slope of the channel, the difference is adjusted by constructing vertical falls or drops in canal bed at suitable intervals. In this course student can get the complete knowledge of well known canal falls, the straight glacis weir and trapezoidal notch fall.

**Course Outcomes:**

- Students will be well versed with the design principles like estimation of discharge at the structure, component parts and drawing specifications of the following irrigation structures
- Canal regulator
- Surplus weir
- Tank sluice with tower head
- Siphon aqueduct
- Trapezoidal notch fall
- Glacis weir

Design and drawing of the following irrigation structures.

1. Straight glacis weir.
2. Tank sluice with tower head
3. Type III Siphon aqueduct.
4. Surplus weir.
5. Trapezoidal notch fall.
6. Canal regulator.

Note: Final Examination pattern: First question compulsory for 14 marks contains seven 2 marks questions from unit I to VI, Three eight marks questions from all units & one thirty two marks question from any of six units has to be answered by the student. The duration of examination will be four hours.

**TEXT BOOKS:**

1. Design of minor irrigation and canal structures by C.Satyanarayana Murthy, Wiley eastern Ltd.
2. Irrigation engineering and Hydraulic structures by S.K.Garg, Standard Book House.

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**(A0137108) ADVANCED FOUNDATION ENGINEERING****(ELECTIVE – III )****Course Objectives:**

- Provide through insight about shallow foundations, deep foundations, sheet pile walls and solutions in problematic soils.

**Course Outcomes:**

- Be able to tackle and design foundation for the given structure.

**UNIT I**

**SHALLOW FOUNDATIONS:** General requirements of foundations. Types of shallow foundations and the factors governing the selection of a type of shallow foundation. Bearing capacity of shallow foundations by Terzaghi's theory and Meyerhof's theory (derivation of expressions and solution to problems based on these theories). Local shear and general shear failure and their identification. Bearing capacity of isolated footing subjected to eccentric and inclined loads. Bearing capacity of isolated footing resting on stratified soils-Button's theory and Siva Reddy analysis.

**UNIT II**

**ANALYSIS AND STRUCTURAL DESIGN OF R.C.C. FOOTINGS:** Analysis and structural design of R.C.C. isolated, combined and strap footings.

**UNIT III**

**DEEFOUNDATIONS-I:** Pile foundations-types of pile foundations. Estimation of bearing capacity of pile foundation by dynamic and static formulae. Bearing capacity and settlement analysis of pile groups. Negative skin Friction, Pile load tests. Under reamed piles-principle of functioning of under reamed pile-Analysis and structural design of under reamed pile.

**UNIT IV**

**DEEP FOUNDATIONS – II:** Well foundations – elements of well foundation. Forces acting on a well foundation. Depth and bearing capacity of well foundation. Design of individual components of well foundation (only forces acting and principles of design). Problems associated with well sinking.

**UNIT V**

**SHEET PILE WALLS:** Cantilever sheet piles and anchored bulkheads, Earth Pressure diagram, Determination of depth of embedment in sands and clays-Timbering of Trenches – Earth Pressure Diagrams – Forces in struts.

**UNIT VI**

**FOUNDATIONS IN PROBLEMATIC SOILS:** Foundations in black cotton soils- basic foundation problems associated with black cotton soils. Lime column techniques – Principles and execution. Use of Cohesive Non Swelling (CNS) layer below shallow foundations.

**TEXT BOOKS :**

1. Analysis and Design of Foundations and Retaining Structures- Shamsheer Prakash, Gopal Ranjan and Swami Saran.
2. Foundation Design-Teng.
3. Geotechnical Engg. – C.Venkatramaiah.
4. Geo technical engineering by V.N.S.Murthy,CRC Press,New Delhi Design of Reinforced concrete Foundations by P.C. Varghese, PHI Publications, New Delhi.

**REFERENCES:-**

1. Analysis and Design of Foundations – E.W.Bowles.
2. Foundation engineering by Brijesh M.Das, Cengage publications,New Delhi.
3. Foundations Design and Construction – Tomlinson.

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**(A0138108) SOIL DYNAMICS AND MACHINE FOUNDATIONS**  
**(ELECTIVE – III)**

**Course Objectives:**

- Provide knowledge in vibrations, vibration of soil system, field and laboratory determination of dynamic soil properties.
- Provide knowledge about machine foundations like reciprocating & impact machines, vibration isolation.

**Course Outcomes:**

- Be able to find the dynamic soil properties.
- Be able provide vibration isolation.
- Be able to design & execute the machine foundations

**UNIT – I**

Theory of vibrations: Basic definitions- free and forced vibrations with and without damping for single degree freedom system- Resonance and its effect – magnification – Logarithmic decrement – Transmissibility

**UNIT – II**

Natural frequency of foundation – Soil system: Barkan's and IS methods – pressure bulb concept – Pauw's Analogy.

Wave propagation: Elastic waves in Rods – Waves in elastic Half space.

**UNIT – III**

Dynamic Soil Properties: Field and Laboratory methods of determination – Uphole, Down hole and cross hole methods – Cyclic plate load test – Block vibration test – Determination of Damping factor.

**UNIT – IV**

Machine Foundations: Types, Design criteria, permissible amplitudes and bearing pressure.

Block foundation: Degrees of freedom - analysis under different modes of vibration

**UNIT – V**

Analysis of Two Degree freedom systems under free and forced vibrations -Principles of Design of Foundations for reciprocating and impact machines as per IS code.

**UNIT – VI**

Vibration Isolation: Types and methods – Isolating materials and their properties

**TEXT BOOKS:**

1. Handbook of Machine Foundations by P.Srinivasulu and G.V.Vaidyanathan, Tata McGraw Hill
2. Soil Dynamics by Shamsheer Prakash

**REFERENCES:**

1. Dynamics of Bases and Foundations by Barken, McGraw Hill Publishing Co., New York
2. Vibration of Soils and Foundations by Richart, Hall and Woods, Prentice Hall, Eaglewood Cliffs, New Jersey, USA.

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**(A0139108) ADVANCED STRUCTURAL ANALYSIS****(ELECTIVE – III)****Course Objectives:**

- The course objective of this subject consist of Design of retaining wall, cantilever, and counter fort, RCC water, circular, rectangle tank, and chimney.

**Course Outcomes:**

- Graduates will develop the designing knowledge
- Able to the design of different elements which is listed in course.

**UNIT - I**

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

**UNIT –II****Moment Distribution method:** Application to the analysis of portal frames with inclined legs, gable frames**UNIT – III****Strain energy method:** Application to the analysis of continuous beams and simple portal frames.**UNIT – IV****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.**UNIT - V****Flexibility Method:** Introduction to the structural analysis by flexibility concept using Matrix approach and application to portal frames.**UNIT - VI****Influence lines:** Influence line diagrams for Reaction, Shearing force and Bending moment in case of determinate beams and application of influence line diagrams.**TEXT BOOKS:**

1. Matrix methods of Structural Analysis by Pandit and Gupta – Tata Mc.Graw Hill
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

**REFERENCES:**

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

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**(A0140108) EXPERIMENTAL STRESS ANALYSIS**  
**(ELECTIVE – III)**

**Course Objectives:**

- Discusses the various experimental techniques like photo elasticity, strain gauges, brittle coatings etc for the analysis of problems

**Course Outcomes:**

- Able to select & design the suitable experimental technique based on the problem

**UNIT I**

**PRINCIPLES OF EXPERIMENTAL APPROACH:** Merits of Experimental Analysis Introduction, uses of experimental stress analysis advantages of experimental stress analysis, Different methods – Simplification of problems.

**UNIT II**

**STRAIN MEASUREMENT USING STRAIN GAUGES:** Definition of strain and its relation of experimental Determinations Properties of Strain Gauge Systems-Types of Strain – Gauge Systems-Types of Strain Gauges – Mechanical, Acoustic and Optical Strain Gauges.

**UNIT III**

**ELECTRICAL STRAIN GAUGES:** Inductance strain gauges – LVDT – Resistance strain gauges – various types – Gauge factor – Materials of adhesion base etc.

**STRAIN ROSETTES:** Introduction – The three element Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge.

**UNIT IV:**

**NON-DESTRUCTIVE TESTING:** Ultrasonic Pulse Velocity method – Application to Concrete – hammer Test Application to Concrete.

**BRITTLE COATING METHODS:** Introduction – Coating Stress – Failure Theories – Brittle Coating Crack Patterns – Crack Detection – Types of Brittle Coating – Test Procedures for Brittle Coating Analysis – Calibration Procedures – Analysis of Brittle Coating Data.

**UNIT V:**

**THEROY OF PHOTOELASTICITY:** Introduction – Temporary Double refraction – The stress Optic Law – Effects of stressed model in a polariscope for various arrangements – Fringe Sharpening. Brewster's Stress Optic law.

**UNIT VI:**

**TWO DIMENSIONAL PHOTOELASTICITY:** Introduction – Isochromic Fringe patterns – Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Isoclinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses – Materials for photo – Elasticity Properties of Photoelastic Materials.

**REFERENCE BOOKS :**

1. Experimental stress analysis by J.W.Dally and W.F.Riley
2. Experimental stress analysis by Dr.Sadhu Singh.
3. Experimental stress analysis by Vazrani & Ratwani.



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**(A0141108) FIRE SAFETY ENGINEERING DESIGN OF STRUCTURES**  
**(ELECTIVE – III)**

**Course Objectives:**

- Fire safety is very important for any structural design
- So, This course focus on different methods and approaches to be considered while designing any RCC, Steel or any other structures
- This course also enables the students to know about Design concerns- Regulatory control-Fire precautions during construction and maintenance
- Students can also learn behaviors of fires, behavior of different materials at different temperatures

**Course Outcomes:**

- Able to design the structures which will with stand the fires
- Able to understand the material behavior at different temperatures
- Able to follow and guide the people about the fire safety regulations, standards, design considerations etc.

**UNIT – I**

**Fire safety engineering**-Design concerns- Regulatory control-Fire precautions during construction and maintenance

**Design philosophies** -Ambient limit state design-Fire limit states-Assessment models-Applicability of assessment levels- Interaction between active and passive measures

**UNIT –II**

**Prescriptive approach**-Standard fire test-Drawbacks to the fire test-Prescriptive determination of fire resistance  
**Behaviour of natural fires**-Development of compartment fires-Factors affecting the growth phase-Calculation of compartment temperature–time responses-Estimation of fire characteristics-Fire severity and time equivalence-Localized fires

**UNIT –III**

**Properties of materials at elevated temperatures**-Thermal data- Materials data-Constitutive stress–strain laws  
**Calculation approach**-Thermal analysis-Calculation of temperature in timber element-Structural analysis

**UNIT- IV**

Design of concrete elements- Design of steel elements

**UNIT –V**

Composite construction-Design of timber elements

**UNIT – VI**

**Masonry, aluminium, plastics and glass- Frames-Assessment and repair of fire-damaged structures**

**TEST BOOK:**

1. Fire Safety Engineering Design of Structures John A. Purkiss BSc(Eng), PhD- Elsevier publications

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**(A0142108) INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT****(ELECTIVE – IV)****Course Objectives:**

- Civil engineers, apart from giving designs for construction of any industry, he must be in a position to calculate the waste produced from that industry.
- This course motivates the students to learn different concepts of about the different types of industrial sources for wastewater production, its quality and quantity of production, different methods to treat industrial wastewater so that the effluent will meet the discharge standards
- Also, provides knowledge on quantity of solid waste from industries, its handling techniques, disposal methods etc.
- Also, focuses on case studies on particular industries like tanning, textile etc.

**Course Outcomes:**

- Can be able to analyze the quantity of industrial wastewater, sludge, solid mass produced
- Can be able to suggest suitable treatment techniques to treat and dispose industrial wastes
- Can learn field and on site knowledge of different industries, their operations, techniques of waste treatment, disposal etc.
- Can be able employ the case studies knowledge for any relevant projects

**UNIT-I**

**Introduction:** Industrial scenario - Uses of Water by industry - Sources and types of industrial wastewater – Industrial wastewater disposal and environmental impacts - Reasons for treatment of industrial wastewater – Regulatory requirements - Industrial waste survey - Industrial wastewater generation rates, characterization and variables - Population equivalent - Toxicity of industrial effluents and Bioassay tests - Preventing and minimizing wastes at the source –

**UNIT-II**

**Industrial Wastewater Treatment:** Equalisation - Neutralisation - Oil separation - Flotation - Precipitation - Heavy metal Removal – Refractory organics separation by adsorption - Aerobic and anaerobic biological treatment - Sequencing batch reactors – High Rate reactors

**UNIT-III**

**Advanced Wastewater Treatment And Reuse:** Chemical oxidation - Ozonation - Photocatalysis - Wet Air Oxidation - Evaporation - Ion Exchange – Membrane Technologies - Nutrient removal - Land Treatment.

**UNIT-IV**

**Disposal and Treatment:** Industrial waste water discharges into streams. Lakes and oceans and problems, Common Effluent Treatment Plants – Advantages and Suitability, Limitations, Effluent Disposal Methods

**UNIT-V**

**Residuals Management:** Residuals of industrial wastewater treatment - Quantification and characteristics of Sludge -Thickening, digestion, conditioning, dewatering and disposal of sludge - Management of RO rejects.

**UNIT-VI**

**Case Studies :** Industrial manufacturing process description, wastewater characteristics and waste treatment flow sheet for Textiles - Tanneries - Pulp and paper - metal finishing – Petroleum Refining - Chemical industries - Sugar and Distilleries -Dairy - Iron and steel - fertilizers - Industrial clusters and Industrial Estates  
Industrial manufacturing process description, wastewater characteristics and waste treatment flow sheet for Textiles - Tanneries - Pulp and paper - metal finishing - Petroleum Refining - Chemical industries - Sugar and Distilleries -Dairy - Iron and steel - fertilizers - Industrial clusters and Industrial Estates.

**TEXT BOOKS:**

1. Eckenfelder, W.W., (1999) " Industrial Water Pollution Control ", Mc-Graw Hill.
2. Arceivala, S.J., (1998) " Wastewater Treatment for Pollution Control ", Tata McGraw Hill.

**REFERENCE:**

1. World Bank Group (1998) " Pollution Prevention and Abatement Handbook - Towards Cleaner Production ", World Bank and UNEP, Washington D.C.

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3+1\* 4**(A0143108) PAVEMENT ANALYSIS AND DESIGN****(ELECTIVE – IV)****Course Objectives:**

- The course objective covers the design of flexible pavements, design of Rigid pavements, Highway materials, Highway construction

**Course Outcomes:**

- Identify the properties of the soil and different construction methods of the pavements, Design of pavements

**UNIT – I**

Types of pavement – Factors affecting design of pavements – wheel loads –ESWL Concept- tyre pressure – contact pressure, Material characteristics – Environmental and other factors.

**UNIT – II**

Stresses in flexible pavement – layered systems concept – one layer system – Boussinesq Two layer system – Burmister Theory for Pavement Design.

**UNIT – III**

Stresses in rigid pavements – relative stiffness of slab, modulus of sub-grade reaction – stresses due to warping, stresses due to loads, stresses due to friction.

**UNIT – IV**

Pavement design: CBR Method of Flexible Pavement Design- IRC method of flexible pavement design.- AASHO Method of Flexible Pavement design

IRC method of Rigid pavement design – Importance of Joints in Rigid Pavements- Types of Joints – Use of Tie Bars and Dowell Bars.

**UNIT – V**

Need for Highway Maintenance- Pavement Failures- Failures in Flexible Pavements-Types and Causes-Rigid Pavement Failures- Types and causes- Pavement Evaluation- Benkleman Beam method- Strengthening of Existing Pavements- Overlays.

**UNIT – VI**

Highway construction – Construction of Earth Roads- Gravel Roads – WBM Roads- Bituminous Pavements- Cement Concrete Roads- Steps in Construction- Reinforced Concrete Pavements – Soil Stabilization – Methods and Objectives- Soil-cement Stabilization and Soil-lime Stabilization.

Need for Highway Maintenance- Pavement Failures- Failures in Flexible Pavements-Types and Causes-Rigid Pavement Failures- Types and causes- Pavement Evaluation- Benkleman Beam method- Strengthening of Existing Pavements- Overlays.

**TEXT BOOKS:**

- Highway Engineering – S.K.Khanna & C.J.Justo, Nemchand & Bros., 7<sup>th</sup> Edition (2000).
- Principles and Practices of Highway Engineering – Dr.L.R.Kadiyali & Dr.N.B.Lal – Khanna publishers – (2003).

**REFERENCES:**

- Principles of pavement design – Yoder & Wit Zorac – John Wiley & Sons.

**CODES:**

- IRC Code for flexible pavement – IRC – 37 -2001.
- IRC Code for Rigid pavement – IRC – 58 – 200

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**(A0144108) PIPE LINE ENGINEERING****(ELECTIVE – IV)****Course Objectives:**

- The water/oil/ gas extracted from wells is transported through pipelines. Due to ever rising demand in the use of pipe lines for various purposes through out the world different companies are trying to stretch as much as they can to meet the requirements. Hence, the need for technically viable engineers is increasing day by day. Keeping in mind this program is designed to provide a broad overview of water supply pipeline engineering from designing to construction.

**Course Outcomes:**

- A general overview of fluid mechanics related to pipeline engineering
- An awareness of the processes and issues involved with designing, procurement and construction
- An awareness of the materials and equipment used
- An understanding of complete surge analysis and surge protection.

**UNIT-1**

**REVIEW OF FLUID MECHANICS OF PIPE FLOWS:** Moody's chart, Minor and major losses in pipes, Darcy weishbach formula, Hagen Williams formula and its modified version; comparison with Colebrook white formula, Rated discharge, One pump and Two pump operations

**UNIT-2**

**PUMPING STATIONS & TRANSMISSION MAINS:** Selection of route for transmission main, Techno economic analysis for pumping mains, Hydraulics of pumping stations, Types of pumps, advantages of pumps, Choice to decide the pump, Layout pumping system – Jackwell, water cooling pump houses, Pump specifications, Pump characteristics, Stand by pumps, Design of sump, Model studies – Froude, Reynold's similitude, NPSH, Design of suction and delivery pipes, System curve fluctuations

**UNIT-3**

**TYPES OF PIPES – 1:** Cast Iron pipes - Advantages & disadvantages, Design principles; Ductile Iron pipes - design principles, Steel pipes – design practices

**UNIT – 4**

**TYPES OF PIPES – 2:** GRP pipes – advantages, design procedure, types of trenches, joints, Pre-stressed concrete pipes – Types, design principles; BWSC pipes – design principles; Pre-cast concrete pipes – design principles; Asbestos cement pipes – design principles; Plastic pipes – design principles

**UNIT - 5**

**FITTINGS/APPURTUNANCES/SUPPORTS:** Types of valves and their specifications, uses – Butterfly, Sluice, Non return valves, Air valves, Scour valves; Thrust blocks – design considerations

**UNIT - 6**

**SURGES & SURGE PROTECTION:** Introction, Basic concepts of surge analysis, Surge protection devices – Air chamber & Surge tanks.

**TEXT BOOK/REFERENCE**

1. Hydraulic Institute standards
2. Modi and Seth: Fluid Mechanics, Standared House, New Delhi
3. Analysis of water surge by J. Pickford, Pitman press, Grate Briton
4. Material supplied by RGM CET, Nandyal

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**(A0145108) GROUND WATER DEVELOPMENT AND MANAGEMENT****(ELECTIVE – IV)****Course Objectives:**

- There is a need to integrate groundwater and surface water management to ensure better overall water management and allocation due to the fact that management and protection of groundwater has been seriously neglected, potentially endangering the resource. Hence Engineers require complete understanding of ground water development and its management. This course discusses the occurrence of ground water & its movement, steady & unsteady flow estimations through confined & unconfined aquifers, surface & subsurface investigation methods, artificial recharging methods, concepts of conjunction use & some case studies.

**Course Outcomes:**

- A general framework of aquifer characterization
- Overview of groundwater and estimations through confined & unconfined aquifers, surface & subsurface investigation methods, artificial recharging methods
- Knowledge to effectively carry out the Groundwater Resources development and management
- Broaden skills in team work, communication and planning through small projects.

**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.

**UNIT – II :** 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 – III :** 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 a well – Non equilibrium equations – Thesis solution – Jacob and Chow's simplifications

**UNIT – IV :** Surface and Subsurface Investigation: Surface methods of exploration – Electrical resistivity and Seismic refraction methods. Subsurface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications along with Case Studies in Subsurface Investigation.

**UNIT – V :** 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. Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben- Herzberg relation, Shape of interface, control of seawater intrusion.

**UNIT – VI :** 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.

**REFERENCES :**

1. Groundwater by Bawvwr, John Wiley & sons.
2. Groundwater Syatem Planning & Managemnet – R.Willes & W.W.G.Yeh, Printice Hall.
3. Applied Hydrogeology by C.W.Fetta, CBS Publishers & Distributers

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**(A0146108) WATERSHED MANAGEMENT**  
**(ELECTIVE – IV)**

**Course Objectives:**

- Watershed management is a planning and implementation process that looks at the total picture of all the water uses, demands, pollutant sources, stresses and conditions, to achieve water quality, supply, flows and ecosystem health that meet society's goals.

**Course Outcomes:**

- understand the basic science and practice of watershed management,
- understand how their major field of interest is used in watershed management,
- practice watershed management basics in a watershed, interacting with local interests and dealing with real issues in a practical manner,
- Have the potential to work in the water management field.

**UNIT-I**

**INTRODUCTION:** Concept of watershed development, objectives of watershed development, need for watershed development in India, Integrated and multidisciplinary approach for watershed management.

**UNIT-II**

**CHARACTERISTICS OF WATERSHED:** size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watersheds.

**UNIT-III**

**PRINCIPLES OF EROSION:** Types of erosion, factors affecting erosion, effects of erosion on land fertility and land capability, estimation of soil loss due to erosion, Universal soil loss equation. Measures to control erosion-

Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, rockfill dams, brushwood dam, Gabion.

**UNIT-IV**

**WATER HARVESTING:** Rainwater Harvesting, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds, mini-percolation tanks, draught pond, rock-fill dams, subsurface dams.

**UNIT-V**

**LAND MANAGEMENT:** Land use and Land capability classification, management of forest, agricultural, grassland and wild land. Reclamation of saline and alkaline soils.

**UNIT-VI**

**ECOSYSTEM MANAGEMENT:** Role of Ecosystem, crop husbandry, soil enrichment, inter, mixed and strip cropping, cropping pattern, sustainable agriculture, bio-mass management, dry land agriculture, Silvi pasture, horticulture, social forestry and afforestation. Planning & watershed management activities, peoples participation, preparation of action plan, administrative requirements.

**TEXT BOOKS:**

1. Watershed Management by JVS Murthy, - New Age International Publishers.
2. Water Resource Engineering by R.Awurbs and WP James, - Prentice Hall Publishers.

**REFERENCE:**

1. Land and Water Management by VVN Murthy, - Kalyani Publications.
2. Irrigation and Water Management by D.K.Majumdar, Printice Hall of India

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**(A0147108) CONCRETE TECHNOLOGY****(ELECTIVE – IV)****Course Objectives:**

- Concrete is widely used in construction of various structures such as buildings, pavements, dams etc.,
- The course covers the cements& admixtures, aggregates, fresh concrete, harden concrete, tests on harden concrete

**Course Outcomes:**

- Identification of various tests on cement, Aggregate, concrete
- Identification of properties of the materials
- Identification of various concrete mix designs

**UNIT- I**

**CEMENTS & ADMIXTURES:** Portland cement – chemical composition – Test's on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures.

**UNIT – II**

**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 – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates

**UNIT – III**

**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.

**UNIT – IV**

**HARDENED CONCRETE :** Water / Cement ratio – Abram's Law – Nature of strength of concrete – Strength in tension & compression – Factors affecting strength

**TESTING OF HARDENED CONCRETE:** Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Schmidt's Rebound Hammer Test.

**UNIT – V**

**MIX DESIGN :** Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete Proportioning of concrete mixes by various methods – ACI method & IS 10262 method

**UNIT – VI**

**SPECIAL CONCRETES:** Light weight aggregates – Light weight aggregate concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C

**TEXT BOOKS:**

1. Concrete Technology by M.S.Shetty. – S.Chand & Co. ; 2004



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**(A0148108) MAINTENANCE AND REPAIR OF BUILDINGS**  
**(AUDIT COURSE)**

**Course Objectives:**

- Provides insight into various maintenance & repair techniques

**Course Outcomes:**

- Able to suggest the proper maintenance or repair technique to suit to the situation

**UNIT-I**

Durability: Life expectancy of different types of buildings-influence of environmental elements such as heat, moisture, precipitation and frost on buildings- Effects of biological agents like fungus, moss, plants, trees, algae-chemical attack on building materials and components- Aspects of fire and fire prevention on buildings-Impact of pollution on buildings.

**UNIT-II**

Performance of building materials in service-maintenance philosophy – phases of maintenance-routine preventive and curative maintenance- methods, specification and cost analysis- common defects in buildings and measures to prevent and control the same-Building failures- causes and effects- cracks in buildings- types, classification & investigation

**UNIT-III**

Non destructive tests – RCPT –PUDIT, Hammer test, corrosion, rebar location test, water permeability- Rapid chloride permeability Anti Termite Treatment- pre-constructural treatment and post constructional treatment methods.

**UNIT-IV**

Techniques for repair-surface repair-material selection-surface preparation –rust eliminators and polymers – coating for rebar during repair – repair of cracks in concrete and masonry – methods of repair- epoxy injection, mortar repair for cracks-guniting and shotcreting- Water proofing of concrete roofs.

**UNIT-V**

Strengthening measures-flexural strengthening, beam shear capacity strengthening, column strengthening, shorting, under pinning and jacketing- Conservation movement- materials and methods for conservation work-examples

**UNIT-VI**

Recycling of building components and materials-adaptive reuse of buildings and its advantages- examples- Demolition of buildings- introduction-planning, precautions and protective measures in demolition work-sequence of operations- demolition of structural elements.

**Text Books**

1. Champion.S- Failure and Repair of Concrete Structures
2. Sidney M. Johnson- Deterioration, Maintenance and Repair of Structures, Mc Graw Hill

**References**

1. Peter H. Emmons- Concrete Repair and Maintenance- Galgotia Publishers
2. Jacod Feld – Construction Failure
3. SP 25- BIS Causes and prevention of cracks in buildings
4. Mckaig T.M. – Building Failures-Applied Science Publications
5. SP 62 – Hand Book on Building Construction Practices –BIS
6. Philip.H. Perkins – Concrete Structures- Repair, water proofing and protection
7. Raikar- Durable Structures- Through Planning for Preventive Maintenance- R and D Centre Structural Designers and Consultants Pvt Ltd, Vashi, New Bombay