AUTONOMOUS NANDYAL-518501, KURNOOL DIST., A.P., INDIA

CIVIL ENGINEERING



ESTD: 1995

B.TECH SYLLABUS 2015

Applicable for students admitted into B.Tech (Regular) from 2015-16

REGULATIONS, COURSE STRUCTURE & DETAILED SYLLABUS

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

ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABI

B.Tech. (Regular) from 2015-16 and B.Tech. (Lateral Entry Scheme) from 2016-17

For pursuing four year Bachelor Degree Program (under graduate) 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 RGMCET (Autonomous):

All the rules specified herein approved by the Academic Council will be in force and applicable to students admitted from the Academic Year 2015-16 onwards. Any reference to "Institute" or "College" in these rules and regulations shall stand for Rajeev Gandhi Memorial College of Engineering and Technology (Autonomous).

All the rules and regulations, specified hereafter 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 Program 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 examination certified by State Board of Technical Education) for admission.
- **ii**) Secured a rank in the EAMCET examination conducted by AP 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 program 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 Program 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 is to be obtained.
- **ii**) 20% of the sanctioned strength in each program of study (of RGMCET) shall be filled by the Convener, ECET as lateral entry.

List of Programs offered

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

Academic Regulations for 2015 B. Tech. (Regular)

(Effective for the students admitted into the I year from the Academic Year 2015-2016)

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

1.0 Award of B.Tech. Degree

- **1.1** The student will be declared eligible for the award of the B. Tech. degree if he fulfils the following academic regulations:
- **1.2** Pursued a course of study for not less than prescribed course work duration and not more than double the prescribed course work duration.
- **1.3** Registered for 200 credits and secured a minimum of 194credits with compulsory subjects as listed in Table-1 below.

S.No	SUBJECT PARTICULARS
1	All the first year subjects
2	All practical subjects
3	All Skill Development Courses/ value added courses
4	Mini project
5	Seminar
б	Comprehensive viva - voce
7	Project work
8.	Extra Academic Activities(EAA)

Table 1: Compulsory Subjects

2.0 Forfeit of seat

Students, who fail to fulfill all the academic requirements for the award of the degree within <u>eight</u> <u>academic years</u> 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. Information Technology
- 6. Mechanical Engineering

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

```
Table 2: Credits
```

Subject	Semester				
	Periods/	Credits	Internal	External	
	Week		Marks	Marks	
Theory	3+1*	03	30	70	
Practical/Mini project	03	02	25	50	
Drawing	03	03	30	70	
Skill Development Courses/Value	1+2*	01**	100		
Added Course			(30 IM + 70 EM)		
EAA (Extra Academic Activities)	02	01	00	00	
Seminar		01	50		
Comprehensive Viva-voce		02		50	
Project		08	50	100	

*Tutorial

**[Skill Development Courses / value Added 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% marks.EAA courses will not have any marks. The credits obtained in Skill development courses and EAA will be taken in to account for the award of degree.]

4.0 Distribution and Weight age of Marks

- **4.1** The performance of the student in each semester 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 or field work/group task) and 70 marks for the End-Examination.
- **4.3** 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 are to be answered. The duration of internal test will be for 2hours. First test to be conducted in 3 units and second test to be conducted in the remaining 3 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 weight age of 0.75 for the better score and 0.25 for the other score will be considered. There shall be two assignments in each subject (problem based/ field work/group task) for award of 05 marks so that internal component (marks) will be 30 marks (25 marks for internal test+05 marks for assignments / field work/group task).

Table 5: Units for Internal Tests

Semester					
3 Units	First Internal test				
3 Units	Second Internal test				

- **4.4** In the case of Skill Development Courses, two Internal examinations shall be conducted one in the middle of the semester and the other at the end of the semester for 30 marks and the marks scored by the student in these exams with a weight age of 0.75 for better score and 0.25 for the other score will be awarded as Internal marks for 30. For the remaining 70 marks an end examination will be conducted along with other theory examinations. However skill development courses/Value added courses, end examination will be evaluated internally.
- **4.5** No makeup test for internal examination or assignments/group tasks 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.
- **4.6** Elective subjects will commence from 3rd year second semester onwards. Out of the electives offered in 3-2 semester, one elective will be MOOC/Elective offered by the department. Any student who is interested can opt for the MOOC (Self Study) / Elective offered by the department and acquires the required credits. Even if the student opts MOOC, he has to write two internal tests besides the end examination conducted by the institute like other subjects. However, he has to obtain the certificate from the organization in which he has registered. Any MOOC selected by the student should be of more than 45 hours duration and also from the reputed organization. Attendance of the student who has opted for MOOC will be taken from the remaining subjects and labs only in that semester while finalizing the attendance for fulfilling the minimum requirements of attendance for promotion to next semester. Attendance will not be recorded for MOOC.
- **4.7** Gap Year Concept of student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after I/II/III year to pursue entrepreneurship full time. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. An evaluation committee shall be constituted with to evaluate the proposal submitted by the student and committee

shall decide on permitting the student for having the Gap Year. The committee consists of Principal as Chairman and all HODs as members.

- **4.8** In the electives offered in 4-1 semester, one elective will be open elective offered by the other department (inter department). Student has to select one subject among the offered list of open elective subjects. Student has to clear the subject as per norms to get the required credits. At least 40students should register for any open elective; otherwise that open elective will not be offered.
- **4.9** Out of the electives offered in 4-2 semester again one elective will be based on MOOC (Self Study)/Elective offered by the department and the student has to acquire the required credits to clear the subject as specified in 4.9.
- **4.10** The institute would like to offer Minor as optional feature of the B.Tech program aimed at providing additional learning opportunities for academically motivated and bright students. In order to earn a Minor, a student has to earn a minimum of 20 extra credits. For this in addition to the regular subjects, a student has to pursue Four subjects from 3-1 semester onwards. The Minor is indicated by separate CGPA and is reflected in the degree certificate as for example, B.Tech in ECE with Minor in Artificial Intelligence. Each department shall offer at least one Minor. The student has to select the subjects which are not studied in their regular course and student should have cleared all the subjects up to and including 2-1 semester with above 8.5 CGPA (For SC/ST students CGPA 8.0) without any backlog subjects are eligible for registering Minor. GPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep Minor discipline registration active else Minor discipline registration will be cancelled. The breakup of the credits are 4 subjects which carry 16 credits @4 credits for subject and project work carries 4 credits. The evaluation pattern of subjects and project work will be similar to the methods followed in regular course evaluation. Separate course / class work and time table will be arranged for various Minor discipline programmes. Attendance regulations for these Minor discipline programmes will be as per regular courses. Not more than two subjects are allowed for registration in any semester.
- 4.11 Extra Academic Activity (EAA)

Each of the following activities carries one credit and every student is required to register for **two** activities during second year of study which is mandatory.

- a) NSS/NCC
- b) Games and Sports
- c) Yoga/Meditation
- d) Extension Activities
- e) Literary/ Cultural Activities

Any other which may be offered in future

The activities shall be carried out in the allotted hours. The activities will be monitored by the respective faculty in charge, senior faculty member of the department and the HOD. Grades will be awarded on the basis of participation, attendance, performance and behavior. Grades shall be entered in the marks statement as GOOD, SATISFACTORY and UNSATISFACTORY and shall not be counted towards CGPA calculation. If any student gets an Unsatisfactory Grade, he/she has to repeat the activity in the immediate subsequent year.

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. Each question shall have a,b,c... parts.
- **5.2** The End Examination question paper will have 7 questions and students have to answer5 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. Each 14 marks question shall have a, b, c ...parts.

- **5.3** For practical subjects, there shall be a continuous evaluation during the semester for 25 internal marks and End Examination carries 50 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 (15marks 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 better of the two shall be considered for the award of marks for internal tests.
- **5.5** The Engineering drawing, 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 year first semester during lab classes. Implementation or fabrication/simulation 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 the committee consisting of an external Examiner from other institute, Head of the Department and the supervisor of the project. The Internal evaluation of the project work for 50 marks shall be conducted by the committee consisting of the topic of the project. The Internal evaluation of the project work for 50 marks shall be conducted by the committee consisting of head of the Department or his nominee, senior faculty member and the supervisor of project.
- **5.10** For all practical /mini project/main project/comprehensive viva-voce etc the HOD of the concerned dept shall submit a panel of 4 external examiners from different institutes and one will be selected by the Chief Superintendent of the Examination for conducting of end examination.

Sl.	Nature of	Marks	Ту	pe of examination	Scheme of Examination
No.	subject		and	mode of assessment	
1	Theory	70	End l Doub (Inter evalu	Examination de Evaluation mal + External ation)	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 two (semester) Internal examinations with a weight age of 0.75 for better score and 0.25 for the other score.
			05	Assignments/Field work/group task (Internal evaluation)	Average of two assignments/Field work/group task in a semester each evaluated for 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 l (Exte	Examination rnal evaluation)	This End Examination in miniproject will be for a maximum of 50 marks.
		25	Inter	nal evaluation	Day-to-day performance in executing mini project.
4	Seminar	50	Internal evaluation		Based on the performance in two seminars during semester
5	Comprehensi ve Viva	50	Exter	nal evaluation	This end viva voce examinations in all the subjects for 50 marks
6	Project work	100	Exter	nal evaluation	This end viva voce in project work for 100 marks
		50	Inter	nal evaluation	These 50 marks will be based on the performance of the student in the project reviews apart from attendance and regularity
7	Skill Development Courses/ Value Added Course/ Mock interviews	30	Internal evaluation		These 30 marks are awarded to the students based on the performance of two Internal examinations with a weight age of 0.75 for better score and 0.25 for the other score.
	and Group Discussion	70	Inter	nal Evaluation	Based on the performance in the end examination.
8	EAA	00	Inter	nal evaluation	Based on performance and committee report.

Table4: Distribution of weight ages for examination and evaluation

6.0 Attendance Requirements:

- **6.1** The student shall be eligible to appear for End examinations of the semester if he acquires a minimum of 75% of attendance in aggregate of all the subjects of that semester.
- **6.2** Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in a semester may be granted by the College Academic Committee.

Autonomous

CIVIL ENGINEERING

- **6.3** The student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester. They may seek re-admission for that semester when offered next.
- 6.4 Shortage of Attendance below 65% in aggregate shall in <u>NO</u> case be condoned.
- **6.5** Students whose shortage of attendance is not condoned in any semester are not eligible to take their End Examination of that class and their registration shall stand cancelled.
- 6.6 The stipulated fee shall be payable towards condonation of shortage of attendance.
- 6.7 The attendance in each subject will be recorded in the Marks memo.

7.0 Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item No.6.0.

- 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 Skill Development Coursesor 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 a minimum of 51credits out of 102credits from all the exams conducted up to and including II year II semester regular examinations 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 minimum of 76 credits out of 152credits from all the exams conducted up to and including III year II semester regular examinations ,whether the candidate takes the examinations or not.

Table 5: I follotion fulles							
Promotion from	Total credits to	Minimum credits to					
	register	obtain for promotion					
II yr to III yr	102	51					
III yr to IV yr	152	76					

Table 5: Promotion rules

- 7.4 The student shall register and put up minimum attendance in all 200 credits and earn a minimum of 194credits.Marks obtained in the best186credits(excluding the credits obtained in Skill Development Courses/VAC/Mock interviews and GD and EAA) shall be considered for the calculation of percentage of marks.
- **7.5** Students who fail to earn 194 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.

8.0 Course pattern:

- 8.1 The entire course of study is of four academic years. Each academic year consists of two semesters
- **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.

Autonomous				
CIVIL ENGINEERING				

Year	Semester	No. of S	Subjects	No. ofSkill Development Courses	Number of Labs		Total credits	
First year	First	CE/ME/ CSE 06 {ENG-I, M-I, EP, MEC,CP, COPE 11	ECE/ EEE/ IT 06 {ENG-I M-I, ED, CP, EP,	00	CE/ ME/ CSE EC lab, CP lab, EWS, ELCS	ECE/ EEE/ IT EP Lab, CP lab, ITWS, Core1 lab	6X3=18 4X2=08	26
	Second	06 { Eng-II M-II, SSP/MP, DS,ED, CORE-II}	06 { Eng-II M-II, SSP, MEC,DS, CORE-II}	00	EP lab, DS Lab, ITWS Core-II lab	EC lab, DS lab, EWS, Core-II Lab	6X3=18 4X2=08	26
First		C)6	01		Subjects SDC/VAC Labs	6X3=18 1X1=01 3x2=06	25
year	Second	06		01	Subjects 6X3=18 SDC/VAC 1X1=01 Labs 3X2=06		25	
Third year	First	C)6	01		Subjects SDC/VAC Labs	6X3=18 1X1=01 3X2=06	25
	Second	04+01 Elective 01-MOOC/Elective		01	М	Subjects Elective DOC/Elective SDC/VAC Labs	4X3=12 1X3=03 1X3=03 1X1=01 3x2=06	25
	First 05+Open Elective		01	(Mock Interv	Subjects Dpen Elective views and GD Labs Mini project	5X3=15 1X3=03 1X1=01 2X2=03 1X2=03	25	
Fourth year	Second	01+Elective+ MOOC/Elective		01	M0 Compre	Subjects Elective OOC/Elective SDC/VAC Seminar Project Viva EAA	1X3=03 1X3=03 1X3=03 1X1=01 1X1=01 1X1=02 1X8=08 2X1=02	23
						G	rand total	200

Table: 6: Course pattern

9.0 Transitory Regulations:

Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone this course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered subject to section 2.0 and they continue to be in the academic regulations in which they were readmitted.

10.0 With-holding of results:

If the candidate has any dues not paid to the Institute or if any case of indiscipline of malpractice is pending against him, the result of the candidate shall be withheld and he will not be allowed/promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.

11.0 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:

Table 7: Award of Division						
Class Awarded	% of marks to be secured	Division/	CGPA			
First Class with Distinction	70% and above	First class With	≥ 7.5	From the aggregate marks secured		
First Class	Below 70% but not less than 60%	First Class	6.5 and < 7.5	for the best 186 Credits (excluding		
Second Class	Below 60% but not less than 50%	Second Class	\geq 5.5 and < 6.5	Skill Development Courses,		
Pass Class	Below 50% but not less than 40%	Pass	\geq 4 and < 5.5	EAA)		

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

12.0 Grading:

After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student falls.

Table 8: Conversion into Grades and Grade points assigned

Range in which the % of marks in the subject fall	Grade	Grade point Assigned	Performance
90 to 100	0	10	Outstanding
80 to 89.9	A^+	09	Excellent
70 to 79.9	Α	08	Very Good
60 to 69.9	\mathbf{B}^+	07	Good
50 to 59.9	В	06	Above Average
45 to 49.9	С	05	Average
40 to 44.9	Р	04	Pass
<40	F	00	Fail
Ab	AB	00	Fail

- **12.1** Requirement for clearing any subject: The students have to obtain a minimum of 35% in End Examination and they have to score minimum of 40% marks from Internal and external exam marks put together to clear the subject. Otherwise they will be awarded fail grade.
- **12.2** F is considered as a fail grade indicating that the student has to reappear for the end supplementary examination in that subject and obtain a non fail grade for clearing that subject.
- **12.3** In case of skill development/ value added course / soft skill subjects, as there is no end exam, all 100 marks are for internal assessment only. Student has to score 40% in these courses to complete the subject which will be evaluated internally. Marks obtained in these courses shall not be considered for award of Division.
- 12.4 To become eligible for the award of degree the student must obtain a minimum CGPA of 4.0

13.0 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. The student is not permitted to improve his performance in any subject in which he has obtained pass grade.

14.0 Grade Point Average (GPA) and Cumulative Grade Point Average(CGPA)

The Grade Point Average (GPA) for each semester and Cumulative Grade Point Average (CGPA) up to any semester is calculated as follows:

i) Semester Grade Point Average will be computed as follows:

$$GPA = \frac{\sum_{1}^{n} C_{j} \times GP_{j}}{\sum_{1}^{n} C_{j}}$$

Where, n is the number of subjects in that semester. C_j is Credits for the subjects. GP_j is the grade point obtained for the subject and the summation is over all the subjects in that semester.

ii) A Cumulative Grade Point Average (CGPA) will be computed for every student at the end of each semester. The CGPA would give the cumulative performance of the student from the first semester up to the end of the semester to which it refers to and is calculated as follows:

$$CGPA = \frac{\sum_{1}^{m} GPA_{j} \times TC_{j}}{\sum_{1}^{m} TC_{j}}$$

Where 'm' is the number of semester under consideration. TC_j the total number of credits for a jth semester and GPA_j is the Grade Point Average of the jth semester. Both GPA and CGPA will be rounded off to the second digit after decimal and recorded as such.

While computing the GPA / CGPA, the subjects in which the student is awarded zero grade points will also be included.

15.0 Grade Sheet:

A grade sheet (Memorandum) will be issued to each student indicating his performance in all subjects of that semester in the form of grades and also indicating the GPA and CGPA.

16.0 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.

17.0 Rules of Discipline:

- **17.1** Any attempt by any student to influence the teachers, Examiners, faculty and staff of Examination section 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.
- **17.2** 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.
- **17.3** 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).
- **17.4** When the student's answer book is confiscated for any kind of attempted or suspected malpractice, the decision of the Chief Superintendent is final.

18.0 Minimum Instruction Days:

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

19.0 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. However students will continue to be in the academic regulations in which they were readmitted.

20.0 Transfers

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

21.0 General:

- 21.1 The Academic Regulations should be read as a whole for the purpose of any interpretation.
- **21.2** In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.
- **21.3** 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.
- 21.4 Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

Academic Regulations for B. Tech. (Lateral Entry Scheme)

(Effective for the students getting admitted into II year from the Academic Year 2016-2017 onwards)

- **1.0** The Students have to acquire a minimum of 142credits out of 148from 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 securing minimum of 50 credits out of 100 credits from all the exams conducted up to and including III year II semester regular examinations, whether the candidate takes the examinations or not.

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 134 credits will be considered for the calculation of percentage and award of class.

Class Awarded	% of marks to be secured	Division/ Class	CGPA	From the
First Class with Distinction	70% and above	First class With Distinction	≥ 7.5	marks secured for best 134
First Class	Below 70% but not less than 60%	First Class	6.5 <i>and</i> < 7.5	(i.e. II year to IV year)
Second Class	Below 60% but not less than 50%	Second Class	≥ 5.5 and < 6.5	excluding Skill
Pass Class	Below 50% but not less than 40%	Pass	$\geq 4 and < 5.5$	Courses

Table	1:	Award	of Div	vision
-------	----	-------	--------	--------

(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).

Autonomous CIVIL ENGINEERING

		Ho	urs/W	eek		Marks		
Subject Code	Name of the Subject	Theory	Tutorial	Lab	Credits	Internal	External	Total
THEORY								
A0001151	Professional English –I	3	1	-	3	30	70	100
A0004151	Mathematics-I	3	1	-	3	30	70	100
A0002151	Engineering Physics	3	1	-	3	30	70	100
A0003151	Modern Engineering Chemistry	3	1	-	3	30	70	100
A0501151	C Programming	3	1	-	3	30	70	100
A0101151	Applied Mechanics-I	3	1	-	3	30	70	100
PRACTIC	ALS							
A0091151	Engineering Chemistry Lab	-	-	3	2	25	50	75
A0591151	C Programming Lab	-	-	3	2	25	50	75
A0391151	Engineering Workshop	-	-	3	2	25	50	75
A0092151	English Language Communication Skills Lab	-	-	3	2	25	50	75
Contact Pe	riods / Week	18	6	12	26	280	620	900

I B.TECH, I-SEMESTER COURSE STRUCTURE

I B.TECH, II-SEMESTER COURSE STRUCTURE

		Hours/We		eek		Marks		
Subject Code	Name of the Subject	Theory	Tutorial	Lab	Credits	Internal	External	Total
THEORY								
A0005152	Professional English –II	3	1	-	3	30	70	100
A0006152	Mathematics-II	3	1	-	3	30	70	100
A0007152	Material Physics	3	1	-	3	30	70	100
A0502152	Data Structures Through C	3	1	-	3	30	70	100
A0301152	Engineering Drawing	3	3	-	3	30	70	100
A0102152	Applied Mechanics-II	3	1	-	3	30	70	100
PRACTIC	ALS							
A0093152	Physics Lab	-	-	3	2	25	50	75
A0592152	Data Structures through C Lab	-	-	3	2	25	50	75
A1291152	Information Technology Workshop	-	-	3	2	25	50	75
A0191152	Applied Mechanics Lab	-	-	3	2	25	50	75
Contact Pe	riods / Week	18	8	12	26	280	620	900

Autonomous CIVIL ENGINEERING

		Ho	urs/W	eek			Marks	
Subject Code	Name of the Subject	Theory	Tutorial	Lab	Credits	Internal	External	Total
THEORY								
A0015153	Mathematical Methods	3	1	-	3	30	70	100
A0201153	Basics Electrical & Electronics Engineering	3	1	-	3	30	70	100
A0009153	Environmental Science	3	1	-	3	30	70	100
A0149153	Strength of Materials – I	3	1	-	3	30	70	100
A0103153	Geodetic Engineering	3	1	-	3	30	70	100
A0104153	Fluid Mechanics	3	1	-	3	30	70	100
SKILL DE	VELOPMENT COURSE							
A0010153	Aptitude Arithmetic Reasoning & Comprehension	1	2	-	1	30	70 (Internal Evaluation)	100
PRACTICA	ALS							
A0192153	Geodetic Engineering Lab – I	-	-	3	2	25	50	75
A0193153	Strength of Materials Lab	-	-	3	2	25	50	75
A0291153	Basic Electrical & Electronics Engineering Lab	-	-	3	2	25	50	75
Contact Pe	riods / Week	19	8	9	25	285	640	925

II B.TECH, I-SEMESTER COURSE STRUCTURE

II B.TECH, II-SEMESTER COURSE STRUCTURE

		Ηοι	ırs/We	eek			Marks	
Subject Code	Name of the Subject	Theory	Tutorial	Lab	Credits	Internal	External	Total
THEORY								
A0105154	Engineering Geology	3	1	-	3	30	70	100
A0106154	Building Materials and Construction	3	1	-	3	30	70	100
A0107154	Strength of Materials – II	3	1	-	3	30	70	100
A0108154	Hydraulics and Hydraulic Machinery	3	1	-	3	30	70	100
A0109154	Structural Analysis – I	3	1	-	3	30	70	100
A0110154	Concrete Technology	3	1	-	3	30	70	100
SKILL DEV	ELOPMENT COURSE							
A0011154	Corporate Management Skills	1	2	-	1	30	70 (Internal Evaluation)	100
PRACTICA	LS							
A0194154	Fluid Mechanics and Hydraulic Machines Lab	-	-	3	2	25	50	75
A0195154	Geodetic Engineering Lab – II	-	-	3	2	25	50	75
A0196154	Building Planning & Drawing Lab	-	-	3	2	25	50	75
Contact Peri	ods / Week	19	8	9	25	285	640	925

Autonomous CIVIL ENGINEERING

III B.TECH, I-SEMESTER COURSE STRUCTURE

			urs/W	eek		Marks		
Subject Code	Name of the Subject	Theory	Tutorial	Lab	Credits	Internal	External	Total
THEORY								
A0111155	Structural Analysis –II	3	1	-	3	30	70	100
A0112155	Transportation Engineering-I	3	1	-	3	30	70	100
A0113155	Design of Reinforced Concrete Structural Elements	3	1	-	3	30	70	100
A0114155	Water Resources Engineering –I	3	1	-	3	30	70	100
A0115155	Environmental Engineering –I	3	1	-	3	30	70	100
A0116155	Geotechnical Engineering-I	3	1	-	3	30	70	100
SKILL DEV	ELOPMENT COURSE							
A0117155	Construction Technology & Project Management	1	2	-	1	30	70 (Internal Evaluation)	100
PRACTICAL	LS							
A0197155	Concrete Technology Lab	-	-	3	2	25	50	75
A0198155	Geotechnical Engineering Lab	-	-	3	2	25	50	75
A0199155	Civil Engineering Drawing Using AutoCAD Lab	-	-	3	2	25	50	75
Contact Peri	ods / Week	19	8	9	25	285	640	925

III B.TECH, II-SEMESTER COURSE STRUCTURE

		Ho	urs/W	eek			Marks	
Subject Code	Name of the Subject	Theory	Tutorial	Lab	Credits	Internal	External	Total
THEORY								
A0118156	Geotechnical Engineering –II	3	1	-	3	30	70	100
A0119156	Design of Steel Structural Elements	3	1	-	3	30	70	100
A0120156	Water Resources Engineering -II	3	1	-	3	30	70	100
A0121156	Environmental Engineering –II	3	1	-	3	30	70	100
	Elective –I /MOOCS	3	1	-	3	30	70	100
	Elective –II	3	1	-	3	30	70	100
SKILL DEV	ELOPMENT COURSE							
A0013156	Professional Ethics and soft skills	1	2	-	1	30	70 (Internal Evaluation)	100
PRACTICAL	LS							
A0181156	Transportation Engineering Lab	-	-	3	2	25	50	75
A0182156	Environmental Engineering Lab	-	-	3	2	25	50	75
A0183156	CAD Lab	-	-	3	2	25	50	75
Contact Peri	ods / Week	19	8	9	25	285	640	925

Autonomous CIVIL ENGINEERING

IV B.TECH, I-SEMESTER COURSE STRUCTURE

	Name of the Subject	Ho	urs/W	eek		Marks				
Subject Code		Theory	Tutorial	Lab	Credits	Internal	External	Total		
THEORY										
A0014157	Managerial Economics and Financial Analysis	3	1	-	3	30	70	100		
A0127157	Transportation Engineering-II	3	1	-	3	30	70	100		
A0128157	Estimation, Costing & Valuation	3	1	-	3	30	70	100		
A0129157	Advanced Structural Design	3	1	-	3	30	70	100		
	Elective – III /Open Elective	3	1	-	3	30	70	100		
	Elective - IV	3	1	-	3	30	70	100		
SKILL DEV	ELOPMENT COURSE									
A0138157	Mock Interviews & Group Discussions	1	2	-	1	30	70 (Internal Evaluation)	100		
PRACTICAL	LS									
A0184157	Geographical Information Systems Practice	-	-	3	2	25	50	75		
A0185157	Case Studies in Civil Engineering	-	-	3	2	25	50	75		
A0186157	Industry Oriented Mini Project (Design Project))	-	-	3	2	25	50	75		
Contact Peri	ods / Week	19	8	9	25	285	640	925		

IV B.TECH, II-SEMESTER COURSE STRUCTURE

		Ho	urs/W	eek			Marks		
Subject Code	Name of the Subject	Theory	Tutorial	Lab	Credits	Internal	External	Total	
THEORY									
A0139158	Design and Drawing of Irrigation Structures	3	3	-	3	30	70	100	
	Elective - V(MOOC)	3	1	-	3	30	70	100	
	Elective – VI	3	1	-	3	30	70	100	
SKILL DEV	ELOPMENT COURSE								
A0148158	Green Buildings	1	2	-	1	30	70 (Internal Evaluation)	100	
PRACTICA	LS								
A0187158	Project Work	-	-	-	8	50	100	150	
A0188158	Seminar	-	-	-	1	50	-	50	
A0189158	Comprehensive Viva	-	-	-	2	-	50	50	
	Extracurricular & Co curricular Activities	-	-	-	2	-	-	-	
Contact Peri	ods / Week	10	7	-	23	220	430	650	

Autonomous CIVIL ENGINEERING

ELECTIVES

Subject	EL ECTIVES
Code	ELECTIVES
III B.TECH,	II-SEMESTER
	ELECTIVE – I/MOOC
A0019156	Industrial Management
A0150156	Finite Element Methods in Civil Engineering
A0122156	Water Resources System Planning and Management
A0123156	Pre-stressed Concrete
	ELECTIVE – II
A0124156	Bridge Engineering
A0012156	Probability & Statistics
A0125156	Open Channel Hydraulics
A0126156	Advanced Land Measurement Techniques
IV B.TECH,	I-SEMESTER
	ELECTIVE-III / OPEN ELECTIVES
A0130157	Geoinformatics
A0131157	Railways, Docks & Harbor Engineering
A0132157	Environmental Impact Assessment and Management
A0133157	Building Information Modeling
	ELECTIVE – IV
A0134157	Pavement Analysis and Design
A0135157	Experimental Stress Analysis
A0136157	Fire Safety Engineering Design of Structures
A0137157	Water Shed Management
IV B.TECH,	II-SEMESTER
	ELECTIVE – V/MOOC
A0140158	Advanced Structural Analysis
A0141158	Industrial Waste and Waste Water Management
A0142158	Construction Methods & Equipment
A0147158	Rehabilitation of Structures
	ELECTIVE-VI
A0143158	Ground Improvement Techniques
A0144158	Advanced Foundation Engineering
A0145158	Soil Dynamics and Machine Foundations
A0146158	Earthquake Resistant Design
Cours	ses offered to other branch students (OPEN ELECTIVES)
A0103153	Geodetic Engineering
A0104153	Fluid Mechanics
A0112155	Transportation Engineering –I
A0114155	Water Resources Engineering –I
A0130157	Geoinformatics
A0131157	Railways, Docks & Harbor Engineering
A0132157	Environmental Impact Assessment and Management
A0133157	Building Information Modeling

Autonomous CIVIL ENGINEERING

MINOR ACADEMIC CURRICULUM 2015-16

CIVIL ENGINEERING

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0149153	Strength of Materials-I	3	30	70	100
A0114155	Water Resources Engineering-I	3	30	70	100
A0110154	Concrete Technology	3	30	70	100
A0112155	Transportation Engineering-I	3	30	70	100
A0171158	Minor Project	6			

ELECTRICAL & ELECTRONICS ENGINEERING

POWER ENGINEERING

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0242152	Principles of Electrical Engineering	3	30	70	100
A0208154	Generation & Distribution of Electrical Power	3	30	70	100
A0212155	Transmission of Electrical Power	3	30	70	100
A0239158	Electrical Distribution Systems	3	30	70	100
A0271158	Minor Project	6			

ELECTRICAL MACHINES

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0205153	Circuit Theory	3	30	70	100
A0206153	Electrical Machines-I	3	30	70	100
A0207154	Electrical Machines-II	3	30	70	100
A0210155	Electrical Machines-III	3	30	70	100
A0272158	Minor Project	6			

POWER ELECTRONICS

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0242152	Principles of Electrical Engineering	3	30	70	100
A0211155	Power Electronics-I	3	30	70	100
A0214156	Power Electronics-II	3	30	70	100
A0226157	Power Semiconductor Drives	3	30	70	100
A0273158	Minor Project	6			

Autonomous CIVIL ENGINEERING

MECHANICAL ENGINEERING

THERMAL ENGINEERING

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0306153	Thermodynamics	3	30	70	100
A0309154	Internal Combustion Engines	3	30	70	100
A0313155	Thermal Engineering	3	30	70	100
A0318156	Heat Transfer	3	30	70	100
A0372158	Minor Project	6			

MECHANICAL DESIGN

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0302151	Engineering Mechanics-I	3	30	70	100
A0305153	Material Science & Metallurgy	3	30	70	100
A0312155	Design of Machine Elements-I	3	30	70	100
A0325157	CAD/CAM	3	30	70	100
A0373158	Minor Project	6			

PRODUCTION ENGINEERING

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0311154	Manufacturing Technology	3	30	70	100
A0316155	Machine Tools	3	30	70	100
A0319156	Engineering Metrology	3	30	70	100
A0341158	Modern Manufacturing Methods	3	30	70	100
A0374158	Mini Project	6			

ELECTRONICS & COMMUNICATION ENGINEERING

SIGNAL PROCESSING

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0409153	Signals and Systems	3	30	70	100
A0406157	Digital Signal Processing	3	30	70	100
A0427157	Digital Image Processing	3	30	70	100
A0431157	DSP Architecture and Applications	3	30	70	100
A0471158	Minor Project	6			

Autonomous CIVIL ENGINEERING

EMBEDDED SYSTEMS

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0213155	Microprocessors and Microcontrollers	3	30	70	100
A0426157	VLSI Design	3	30	70	100
A0421156	Embedded System Concepts	3	30	70	100
A0418155	Embedded 'C' & Verilog	3	30	70	100
A0473158	Minor Project	6			

COMPUTER SCIENCE & ENGINEERING

COMPUTER SCIENCE

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0518154	Design and Analysis of Algorithms	3	30	70	100
A0519154	Operating Systems	3	30	70	100
A0514153	Database Management Systems	3	30	70	100
A0509157	Computer Networks	3	30	70	100
A0574158	Minor Project	6			

WEB PROGRAMMING

Subject Code	Course Title	Credits	Internal	External	Total Marks
A0516154	Core Java Programming	3	30	70	100
A0508156	Web Technologies	3	30	70	100
A0510155	C# & .NET Frame Work	3	30	70	100
A0540157	PHP Programming	3	30	70	100
A0575158	Minor Project	6			

INFORMATION TECHNOLOGY

DATABASE TECHNICS

Subject Code	Course Title	Credits	Internal	External	Total Marks
A1202153	Foundations of Software Engineering	3	30	70	100
A1207154	Relational Database Design and Development	3	30	70	100
A1213155	Database Management Concepts	3	30	70	100
A1217156	Software Testing Methodologies and Tools	3	30	70	100
A1271158	Minor Project	6			

Autonomous CIVIL ENGINEERING

WEB TECHNOLOGY CONCEPTS

Subject Code	Course Title	Credits	Internal	External	Total Marks
A1203153	Fundamentals of Object-Oriented Design	3	30	70	100
A1209154	Java Programming	3	30	70	100
A1212155	Web Application Through JAVA & Python	3	30	70	100
A1216156	Basics Of Scripting Languages	3	30	70	100
A1272158	Minor Project	6			

MASTER OF BUSINESS ADMINISTRATION

MARKETING MANAGEMENT

Subject Code	Course Title	Credits	Internal	External	Total Marks
E0011152	Marketing Management	3	30	70	100
E0021153	Product & Brand Management	3	30	70	100
E0033153	Advertising Management	3	30	70	100
E0014152	Business Research Methods	3	30	70	100
E0047254	Minor Project	6			

HUMAN RESOURCE MANAGEMENT

Subject Code	Course Title	Credits	Internal	External	Total Marks
E0009152	Human Resource Management	3	30	70	100
E0028153	Performance Management	3	30	70	100
E0039154	Organization Development	3	30	70	100
E0014152	Business Research Methods	3	30	70	100
E0047154	Minor Project	6			

Programme Outcomes (POs)

- PO 1: **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO 2: **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO 3: **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO 4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO 5: **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO 6: **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO 7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO 8: **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO 9: **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO 10: **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO 11: **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO 12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Autonomous CIVIL ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

PEO 1: Assessing societal needs and plan suitable infrastructure

PEO 2: Analyze and design components of civil engineering projects

PEO 3: Develop team spirit and inter personal dynamics for effective execution and management of projects.

PEO 4: Adhering to lifelong learning and adapt to changing professional and societal needs.

PROGRAM SPECIFIC OUT COMES (PSO)

PSO1: Capability to investigate, plan, analyze and design buildings for different purposes such as residential, commercial, public office, recreational etc. using STADD Pro and relevant software.

PSO2: Competency in preliminary engineering surveys, planning and design of infrastructure viz. roads, bridges and designing traffic control systems etc. using MX Roads and other relevant software programs.

PSO3: Conduct field and laboratory tests for analysis and quality control of civil engineering projects.

Note: Program Outcomes (POs) and Program Specific Outcomes (PSOs) are mapped with Course Outcomes (COs) and they are correlated in following levels

- 1: Slight (Low)
- 2: Moderate (Medium)
- 3: Substantial (High)

Autonomous CIVIL ENGINEERING

I B.Tech, I-Sem (CE)

Т	С
3+1*	3

RGM-R-2015

(A0001151)PROFESSIONAL ENGLISH - I

(Common to all Branches)

English is the international language of business and opens up many opportunities to engineering professionals. This course introduces the essential learning theories and practices needed for a core professional. The course details the needs of LSRW Skills of the English language and explains how to face variant situations through soft skills. With a clear structure and can-do objectives in every Unit, Professional English Course is a straight forward, student-friendly course. It gradually builds up all the necessary knowledge to help students achieve their learning objectives.

OBJECTIVES

Students should be able to:

- Acquire basic language skills in order to communicate in English language.
- Develop their awareness of the importance of English as a means of international communication.
- Develop their LSRW skills, namely listening, speaking, reading and writing skills thereby improving their proficiency in oral and written communication in technical English.
- Develop the linguistic competence that enables them to be aware of the cultural, economical and social issues of the society in order to contribute in giving solutions.

OUTCOMES:

At the end of the course student is able to

- Introduction of English as a Lingua Franca and develop communication and Soft Skills...
- Develop LSRW skills by prescribed lessons and technical reading exercises.
- Inculcate basic letter writing formats
- Develop language through different genres like Short stories, Poems and Films andthereby creating awareness on cultural, economic and social diversities.
- Acquire basic language skills through grammar usage and learn vocabulary from the conceptual clues.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1												1			
CO2	3					2	2	3		2					
CO3	1											1			
CO4	2					3	2	3							
CO5	1					2	2	3		1		1			

UNIT I

Practical English Usage - I

- a) Review of Grammar-Parts of Speech-Tenses
- b) Introduction to International English Language Testing System (IELTS) Level-1
- Practice Tests IELTS

UNIT II

- a) Technical Writing I: Techniques of Writing-Comparison & Contrast Pattern-Cause & Effect Pattern -Paragraph Writing–Developing An Essay-Letter Formats-Full block Format–Official & Business Letters
- b) Soft Skill Fish! Philosophy Attitude is Everything by Harry Paul

UNIT III

- a) Reading Skills SQR3 Technique-Skimming & Scanning- Reading Comprehension
- b) Autobiography New Horizons My Struggle for an Education by Booker T. Washington

UNIT IV

- a) Semantics Etymology Synonyms & Antonyms-Phrasal verbs–Idioms
- b) Essay The Law of Pure Potentiality by Deepak Chopra

Autonomous CIVIL ENGINEERING

UNIT V

- a) Literary Techniques Allegory Metaphor Epithet
- b) Short story New Horizons The Happy Prince by Oscar Wilde
- c) Poem New Horizons Where the Mind is without Fear by Rabindranath Tagore

UNIT VI

- a) Movie Analysis Life of Pi Plot Characterization Techniques
- b) Project & Case Studies

***TEXT BOOK PRESCRIBED: NEW HORIZONS, FOR THE JNTUA, PEARSON, 2014.** SUGGESTED READING:

- 1. Practical English Usage by Michael Swan, Oxford University Press
- 2. Murphy's English Grammar by Raymond Murphy, Cambridge University press 2004
- 3. Technical writing 3rd edition by Sharon J. Gerson & Steven M. Gerson, Pearson Education 2001
- 4. Communication Skills for Engineers(Second Edition) by C. Muralikrishna & Sunita Mishra, Pearson Education Ltd, 2011
- 5. Top tips for IELTS, British Council, On line edition

Autonomous CIVIL ENGINEERING

I B.Tech, I-Sem (CE)

T C 3+1* 3

RGM-R-2015

(A0004151) MATHEMATICS-I (Common to all Branches)

OBJECTIVES:

To make aware students about the importance and symbiosis between Mathematics and Engineering. Achieve confidence with mathematical tools which an essential weapon in modern Graduate Engineer's Armory. Balance between the development of understanding and mastering of solution techniques with emphasis being on the development of student's ability to use Mathematics with understanding to solve engineering problems by retaining the philosophy learning by doing.

OUTCOMES:

At the end of the course student is able to

- ✤ Acquire knowledge of Infinite series, real analysis, ordinary differential equations and Laplace transforms and its applications in Basic sciences, Biological sciences and engineering.
- Understand to solve differential equations of first and higher order with wide range of applications in circuit analysis, fluid dynamics.
- Analyze solutions of differential equations to various physical problems such as Electric circuits, temperature, Concentration and Velocity of fluids in fluid dynamics.
- ✤ Apply Laplace Transform and its Inverse to convert the equations of calculus in to the equations of algebraic with applications in signals and systems of Digital circuit analysis.
- Synthesize real analysis with functions and differential equations with Laplace transforms.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		1		1							1			
CO2	1	3		2											
CO3		2													
CO4				1	3							1			
CO5	1		2												

UNIT – I

Infinite Series: Sequence – Convergence and divergence of sequence. Series – Tests of convergence and divergence – P-Test, Comparison Test, Ratio Test, n-Root Test, logarithmic Test- Alternating Series – Absolute and conditional convergence of series.

UNIT-II

Differential equations of first order and first degree – Exact, linear and Bernoulli equations. Applications to LR & CR circuits, orthogonal trajectories.

UNIT – III

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 – IV

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.Raidus of Curvature.

UNIT – V

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 – VI

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

TEXT BOOKS:

- 1. Advanced Engineering Mathematics By Erwin Kreyszig.
- 2. Advanced Engineering Mathematics By R.K. Jain and S.R.K. Iyengar, Narosa Publications.

REFERENCES:

- 1. A Text Book of Engineering Mathematics, Vol 1, T.K.V. Iyengar, B. Krishna Gandhi and Others S. Chand & Company.
- 2. Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.
- 3. A Text Book of Engineering Mathematics, Thomson Book Collection.
- 4. Engineering Mathematics By Srimantha Pal et.al. Oxford University Press.
- 5. Engineering Mathematics, Sarveswara Rao Koneru, Universities Press.

Autonomous CIVIL ENGINEERING

I B.Tech, I-Sem (CE)

T C 3+1* 3

RGM-R-2015

(A0002151) ENGINEERING PHYSICS

(Common to ALL Branches)

OBJECTIVES:

The Engineering Physics (Physics-I) for undergraduate program is designed

- To develop students with sufficient depth in both engineering and physics skills to produce engineers who can relate fundamental physics to practical engineering problems.
- To nurture innovative talent in modern applied physics, providing students both solid theoretical grounding and training in practical scientific research skills.
- To prepare students for careers in engineering where physics principles can be applied to the development of technology.

Course outcomes (CO):

At the end of the course student is able to

- ♦ Understand the concept of electromagnetic signals by studying light behaviour.
- Apply the concepts of light in optical fibers and light wave communication systems.
- Solve electrical engineering problems using the concepts of wave and particle duality for electrons
- Find remedies for acoustically defected buildings.
- ✤ Apply Ultrasonics for the testing of materials

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		2	1	1							1			
CO2	3		1	1	2										
CO3		3		2	2							1			
CO4		3	2		1		1								
CO5		3	2		2							1			

UNIT I:

WAVE OPTICS: Interference – Types of Interference - Interference in thin films by reflection - Newton's rings – Applications - Diffraction – Distinction Between Interference and Diffraction - Fraunhofer diffraction at a single slit - Fraunhofer diffraction at a double slit (qualitative) - Diffraction grating – Determination of Wavelength of Light - Polarization – Optic axis - Double Refraction in Calcite Crystal - Nicol Prism – Different types of polarized lights - Quarter and Half wave plates – Applications - problems.

UNIT II:

FIBER OPTICS: Principle – Optical Fiber Cable- Propagation of Light in Optical fibres – Acceptance angle, Numerical aperture and Fractional Index change – Types of rays - Types of optical fibres (index, mode and material based) – Losses in Optical Fiber - Fibre optical communication system (Block diagram) – Merits of Optical Fibers – Applications - problems.

UNIT III:

LASERS: Introduction – Characteristics - Einsteins A and B coefficients - Principle of Spontaneous emission and stimulated emission, Population inversion, pumping. – Important Components of a laser - Types of lasers – Nd-YAG, He-Ne, CO₂ and Semiconductor lasers (homo junction GaAs) – Hetrojunction laser – Applications - problems.

UNIT IV:

QUANTUM PHYSICS: Matter waves – properties - de-Broglie's hypothesis – Heisenberg's Uncertainity principle – Electron as a wave experiment - Schrödinger's Time independent wave equation – Physical significance of wave function – Particle in a one dimensional box - problems.

UNIT V:

ACOUSTICS AND ULTRASONICS: Introduction to acoustics - Reverberation and reverberation time - growth and decay of energy - Sabine's formula (qualitative) - absorption coefficient and its measurement - factors affecting architectural acoustics - problems.

Introduction to ultrasonics – Production – magnetostriction effect - magnetostriction generator, piezoelectric effect - piezoelectric generator- Detection of ultrasonic waves – Types of Ultrasonic waves - properties – Cavitations - Non Destructive Testing –pulse echo system through transmission and reflection modes - Testing Methods - A, B and C –scan displays - problems.

UNIT VI:

NUCLEAR ENERGY: Nuclear fission – Discovery of fission, binding energy curve, chain reaction (fission of U235), critical size, critical mass, essentials of nuclear reactor - problems.

Nuclear fusion – Thermonuclear reaction - fusion reaction in stars - p-p cycle, C-N cycle, controlled fusion – fusion reactor - problems.

REFERENCES:

- 1) Arthus Beiser, "Concepts of Modern Physics", Tata Mc Graw Hill Publications, New Delhi.
- 2) Resnick and Halliday, "Physics Volume II", Wiley, New Delhi.
- M.N. Avadhanulu and PG Kshirsagar, 'A Text book of Engineering Physics', S.Chand and company, Ltd., New Delhi, 2014.
- 4) D. K. Bhattacharya and Poonam Tandon, "Engineering Physics", Oxford University Press, 2015.
- 5) R. K. Gaur and S.C. Gupta, "Engineering Physics", Dhanpat Rai Publications, New Delhi.
- 6) Rajagopal, "Engineering Physics", PHI, New Delhi.
- 7) Rajendran, V and Marikani A, "Engineering Physics", Tata Mc Graw Hill Publications Ltd, III Edition, New Delhi.
- 8) Chitra Shadrach and Sivakumar Vadivelu, "Engineering Physics", Pearson Education, New Delhi.

I B.Tech, I-Sem (CE)

T C 3+1* 3

(A0003151) MODERN ENGINEERING CHEMISTRY

(Common to all Branches)

OBJECTIVES:

- To know the importance of water and sustainable utilization of water resources and alternative methods for potable water like Reverse osmosis and the problems raised in the Production of steam by using the boilers are included in Water technology.
- ✤ To identify the structure of organic molecules using photo chemistry and chemical spectroscopy.
- To acquaint the student with concepts of important photo physical and Photochemical processes and spectroscopy.
- * To make the students conversant with basics of polymer chemistry
- To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems.
- To Understand and apply the concepts in electrochemistry and corrosion science

OUTCOMES:

At the end of the course student is able to

- Apply the concepts of Organic chemistry for synthesis.
- Synthesize polymers
- Estimate the hardness of water in terms of Calcium and magnesium ions.
- Standardize solutions using titration, conductivity meter and colorimeter.
- Know the fundamentals of spectroscopy like electromagnetic spectrum, UV visible, IR spectroscopy.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		1												
CO2	1		3									1			
CO3					2										
CO4		3		1	1										
CO5	3	3			1							1			

Detailed syllabus:

UNIT I:

WATER TECHNOLOGY: Sources of Water- Types of impurities in Water- Hardness of Water – Temporary and Permanent hardness-Disadvantages of hard water-Estimation of hardness by EDTA Method, Numerical Problems on Hardness.

Boiler troubles (Sludge, Scale, Caustic Embrittlement, Priming and foaming)–Sofetning of water (Ion exchange, Zeolite Methodes).

Desalination-Reverse Osmosis Method.

Analysis of Water- Alkalinity, Dissolved Oxygen.

UNIT II:

SURFACE CHEMISTRY:

Adsorption: Definition-Types-Langumer Adsorption isotherm-Applications.

Phase Rule: Statement-Explanation of Terms involved With examples –One component System- Water & Sulphr Systems-Condensed Phase Rule- Pb-Ag System.

Engineering Materials:

Abrasives - Mho, s Scale of Hardness-Natural & Synthetic Abrasives-Engineering Applications.

Refractories: Introduction, Classification & Properties Refractories-Reasons for failure of Refractories.

UNIT III:

ELECTRO CHEMISTRY: Conductance – Specific Conductance -Equivalent Conductance – Molar Conductance-Determination of conductance by Wheat Stone Bridge Method-Effect of dilution On Conductance – Conducto metric Titrations(Acid Base&Precipitative Titration)- Electrode Potential- Reference

Electrodes(SHE,Calomel)-Nernst equation- Numerical Problems. Representation of Cell- electro chemical cells- concentration cells.

Ion Selective Electrode-Principle & Applications.

Chemically Modified Electrodes (CMEs): CMEs as Potentiometric and amphereometric sensors.

UNIT IV:

CHEMISTRY OF CORROSSION & ITS PREVENTION: Definition, Mechanism of Dry(oxidation), Wet(Evolution of hydrogen & Absorption of Oxygen) Types of corrosion- Dry Corrosion, and Wet Corrosion, Theories and Mechanism- Galvanic Series- Galvanic Corrosion, Concentration Cell Corrosion, Water line corrosion, Pitting Corrosion. Factors Influencing Corrosion.

Control of Corrosion – Proper designing and material selection-Cathodic Protection – Sacrificial anode and Imprest Current methods. Use of Inhibitors.

Protective coatings: Metalic coatings & applications.

Electro Plating of Chromium & Nickel

UNIT V:

PHOTO CHEMISTRY&SPECTROSCOPY:

Photo Chemistry: Principles-Growthers Droppers law-Stark Einsten law-Lamberts Beers law-Flouroscence-Phosphorescence-Chemiluminiscence-Photosensitization-Quantum efficiency determination-problems

Spectroscopy: Electromagnetic spectrum-absorption of radiation-Electronic, Vibrational and Rotational Transitions.

UV-Visible and IR Spectroscopy Principles, Instrumentation (block diagrams) & applications (Qualitative)

UNIT VI:

POLYMERS AND FUELS:

POLYMER:Basic concepts- Types of Polymerization – Addition and Condensation Polymerization. Mechanism of Addition polymerization.

Plastics: Definition, Thermo & Thermosetting plastics. Preparation, Properties and Engineering Uses of Poly ethylene, Poly vinyl chloride, Teflon, Bakelite,& Nylons.

Elastomers: Processing of Natural Rubber, Compounding of Rubber Drawbacks of Raw Rubber, Vulcanization of Rubber. Preparation, Properties & Uses of Buna-S, Buna-N, Silicone Rubber.

FUELS: Definition, Classification of fuels. Characteristics of a good fuel. Calorific Value and its Units. Determination Calorific Value by Bomb Calorimeter.

Solid Fuel: Analysis of Coal (Proximate & Ultimate)

Liquid Fuels: Petroleum, Refining, Knocking, Octane, Cetane Number.

Gasious Fuels: Producer Gas, Water Gas.

Combustion: Principles and Numerical Problems- Flue gas analysis by Orsat's apparatus.

TEXT BOOKS:

- 1. Text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company,
- 2. 15th edition New Delhi (2008).
- 3. Text book of Engineering Chemistry by sashi chawla, Dhanpat Rai Publishing Company, 12th edition New Delhi (2011).

REFERENCE:

- 1. A text book of Engineering Chemistry by S.S. Dara, S.Chand & Co, New Delhi (2008)
- 2. Dara S.S Text Book Of Engineering Chemistry, S.Chand & Company Ltd, NewDelhi 2003
- 3. Chemistry of Engineering Materials by C.V. Agarwal, Tara Publication, Varanasi.2008
- 4. Physical Chemistry Glasston & Lewis.

Autonomous CIVIL ENGINEERING

I B.Tech, I-Sem (CE)

T C 3+1* 3

RGM-R-2015

(A0501151) C PROGRAMMING (Common to all Branches)

OBJECTIVES:

- ✤ To make students aware about fundamentals of computer programming.
- ✤ To provide exposure on C programming language
- To provide exposure on various C programming concepts like arrays, functions, pointers, structures etc.,
- To develop solutions for various problems by using C programming language by students.

OUTCOMES:

- ✤ At the end of the course student is able to
- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops, arrays and functions.
- Understand the dynamics of memory by the use of pointers.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2		1							1			
CO2	1	2	2		3	1									
CO3	2	2	3	1	2	1									
CO4	2	2	2		2							1			
CO5	1	2	1		2										

UNIT I

INTRODUCTION TO COMPUTER PROGRAMMING LANGUAGES: Evolution of Computer Programming languages. Fundamentals of Algorithms and Flowcharts. Simple examples on how to write and trace an effective algorithms and how to draw an effective flow charts. Program control structures – sequence, selection and iteration. Software Development Method.

UNIT II

C LANGUAGE FUNDAMENTALS: General Form of a C Program, Steps to execute C program, Character set of C language, Data Types, Constants and Variables, Identifiers, Keywords, Operators, Precedence of operators, Expressions. Example Programs on the topics covered in this unit

UNIT III

CONTROL STATEMENTS IN C LANGUAGE: Non iterative statements – if statement, if else statement, nested if else statement, if else ladder statement, switch statement, goto statement. Iterative statements – while loop, do while loop and for loop. Example Programs on the topics covered in this unit.

UNIT IV

ARRAYS IN C LANGUAGE: Importance of an array in C language, Definition, Need of arrays while writing C programs. Types of arrays - One dimensional array, Two dimensional array. Declaration of One dimensional array, initialization of one dimensional array, storing and accessing the elements from a one dimensional array. Two-dimensional Arrays and their declaration, initialization, storing & accessing elements from it. Example Programs on the topics mentioned above. **Strings** - Definition, Declaring and initializing strings, Basic Operations on strings, String handling Functions. Example Programs on the topics mentioned above.

UNIT V

FUNCTIONS IN C LANGUAGE: Top down approach of problem solving, Library Functions and User defined functions. Need for user-defined functions. General form of declaring a function, Elements of an user defined functions- Function definition Function call, Function declaration, Function name, return type, parameters, return statements. Categorization of functions with respect to parameters and return values. Definition of Scope of a variable with suitable examples. Storage Classes - Automatic, External, Static, and Register. Arrays and functions - Passing an entire array as an Argument to a function. Pre-processor Commands. Example Programs on the topics mentioned above.

UNIT VI

POINTERS IN C LANGUAGE: Pointers- Pointer variable and its importance, Pointer variable declaration, initialization of pointer variables, how to access a value from a memory location through it's pointer variable. Arithmetic operations on pointer variables, Scale factor length. Pointers and functions - pointers as function arguments (i.e., call-by-reference), Pointers and Arrays, Pointers and Strings, Array of Pointers, Pointers to Pointers, Generic Pointers, Pointer to Functions. Example Programs on the topics mentioned above.

TEXT BOOKS:

- 1. Programming in C ,Pradeep Dey, Manas Ghosh,Oxford Heigher Education
- 2. Computer programming and Data Structures, E.Balaguruswamy, Tata Mc Graw Hill. 2009 revised edition.
- 3. The C Programming Language, Brian W.Kerninghan, Dennis M.Ritchie
- 4. Programming in C , Dr. N. Uday Bhaskar, Winger publications

REFERENCES:

- 1. Let us C Yeshwanth kanetkar, 8th Edition.BPB Publications
- 2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
- 3. Data Structures using C A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI, Eighth Edition.
- 4. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

Autonomous CIVIL ENGINEERING

I B.Tech, I-Sem (CE)

T C 3+1* 3

RGM-R-2015

(A0101151) APPLIED MECHANICS- I

Pre-requisites: None. OBJECTIVES:

At the end of the course,

- The student should understand the basic principles of mechanics applicable to rigid bodies in equilibrium and the kinematics and kinetics of particle motion.
- The student should be able to apply these principles to the solution of a variety of practical problems and be able to employ their knowledge to solve more complicated problems and study the affect of problem parameters.
- The student should be prepared to continue the study of the dynamics of rigid bodies and the mechanics of solids and fluids.

OUTCOMES:

At the end of the course student is able to

- Understand different types of force systems and to find the resultant of the force system
- Draw free body diagrams and find unknown forces using equations of equilibrium
- ✤ Analyze the given perfect frame using the method of joints, method of sections or tension coefficient method.
- Understand dry friction and apply to solve problems
- Understand centroid and area moment of inertia and find centroid and moment of inertia of given object

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1										3	2	1
CO2	3	3	1										3	2	1
CO3	3	3	2		1								3	2	1
CO4	3	3	1										3	2	1
CO5	3	3	2										3	2	1
Avg.	3	3	1		1								3	2	1

UNIT I

Basic Concepts – Fundamental Concepts & Axioms- Scalar & Vector Quantities-Units and Dimensions-Resultants of Force Systems: Parallelogram law-Forces and components –Components of forces in space-Moment of force-Principle of Moments—Couples-Resultant of Any Force System.

UNIT II

EQUILIBRIUM OF FORCE SYSTEMS: Definition and meaning of equilibrium- Free body diagrams – Equations of equilibrium-Lami's Theorem-Equilibrium of planar systems- Equilibrium of spatial systems.

UNIT III

ANALYSIS OF FRAMES: Introduction-Construction of Trusses – Analysis of Trusses: Method of Joints-Method of sections-Tension coefficient method-Method of members- Frames.

UNIT IV

FRICTION: Introduction – Theory of friction- Angle of friction –Limiting friction-Laws of coulomb friction Static and dynamic friction – Applications of friction-Square Threaded Screws- Belt Friction- Disk Friction-Rolling Resistance.

UNIT V

CENTROIDS AND CENTER OF GRAVITY: Center of Gravity of Flat Plate- Centroids of Areas and Lines-Importance of Centroids and Moment of Area- Centroids Determined by Integration- Centroids of Composite Figures-Theorems of Pappus- Center of Gravity of Bodies- Centroids of Volumes.

UNIT VI

MOMENT OF INERTIA: Area Moment of Inertia – Definition of Moment of Inertia- Polar Moment of Inertia- Radius of Gyration- Transfer Theorem for Moment of Inertia—Moment of Inertia by Integration-Moment of Inertia of Composite Areas- Product of Inertia- Transfer Formula for Product of Inertia-Moment of Inertia with respect of Inclined Axes-Maximum and Minimum Moment of Inertia-Principal Axes.

READING:

- 1. Engineering Mechanics, Fedrinand L.Singer Harper Collins Publishers India.
- 2. Engineering Mechanics, Shames & Rao Pearson Education.
- 3. Engineering Mechanics -by Timoshenko
- 4. EngineeringMechanics-Statics and dynamics, A. Nelson, Tata McGraw-Hill Company.
Autonomous CIVIL ENGINEERING

I B.Tech, I-Sem (CE)

Р	С
3	2

RGM-R-2015

(A0091151) ENGINEERING CHEMISTRY LAB Common to all Branches

OBJECTIVES:

- Chemistry is one subject which gives adequate knowledge about the applications involved in the aerospace, mechanical, environmental and other engineering fields. Knowledge of chemistry plays a vital role in engineering profession enabling the potential engineers to understand and to perform successfully while working on multidisciplinary tasks.
- The main objective of the department is to develop the necessary theoretical and practical aspects required for understanding intricacies of the subject and also give adequate exposure to the applied chemistry aspects in different disciplines of engineering. Our faculty educates the engineering students with all necessary concepts related to chemistry and develops a scientific attitude by means of distinguishing, analyzing and solving various engineering problems. We are training the students to develop their experimental skills and important practical knowledge in engineering by providing sophisticated chemistry laboratory.

OUTCOMES:

- 1) Keen Observation and Skills developed.
- 2) Knowledge of estimation of Quality of water.
- 3) They acquired the knowledge of synthesis of polymering organic compounds.
- 4) The total alkalinity of water and total dissolved oxygen calculated and this will useful while using the water for industrial applications.
- 5) They acquire the knowledge determine the viscosity of oil and bulk density of solid substances.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3			2			1					1
CO2				2	2	1	1					
CO3					3		1					
CO4		1	1		3							
CO5					2	1						

Detailed Syllabus:

1. Standardization of KMnO4 By using Mohr,s salt.

Complexometric Titrations:

- 2. Determination of Hardness of water by using EDTA titration method.
- 3. Estimation of Magnesium ion by using EDTA titration method.
- 4. Estimation of copper ion by using EDTA titration method.
- 5. Estimation of dissolved oxygen by Winklers Method.

Dichrometry:

6. Determination of Ferrous ion by using potassium dichromate.

Conductometric titration:

- 7. Determination of Strength of the given HCl by using conductometric titration.
- 8. Determination of Strength of the given CH3COOH by using conductometric titration.
- 9. Determination of Alkalinity Present in a given solution.
- 10. Verification of Beer,s-Lambert,s Law by KMnO4.

- 11. Determination of Strength Manganese by Colorometric Method
- 12. Determination of Calorific Value of Solid/Liquid fule using Bomb Calorimetre.
- 13. Determination of Viscosity by using Red wood Viscometer-I (or) II
- 14. Potentiometric Determination of iron using StandardK2Cr2O7 Solution.

Demonstration:

- 1. Determination of Bulk density.
- 2. Determination of Refractive index of a given Sollution.
- 3. Preparation of Ethyl Acetate.
- 4. Preparation of Bakelite.
- 5. Determination of pH of Water and various other samples.

- 1. Laboratory Manual on Engineering Chemistry, Sudharani (Dhanpat Rai PublishingCompany).
- 2. Vogel's Textbook of Quantitative chemical analysis, J. Mendham et.al. (Pearson Education).
- 3. Advanced Inorganic Analysis, Agarwal & Keemtilal, Pragati prakashan.
- 4. Chemical tables, Dr N. S. Gnanapragasam, (Sultan Chand & sons).

Autonomous CIVIL ENGINEERING

I B.Tech, I-Sem (CE)

P C 3 2

RGM-R-2015

(A0591151) CPROGRAMMING LAB Common to all Branches

OBJECTIVES:

- ✤ To make the student to learn how to write programs in C language.
- ✤ To introduce different constructs of C language to the students to solve various kinds of problems.
- To make the students to implement different kinds of sorting algorithms like selection sort, bubble sort, insertion sort, quick sort and merge sort etc.
- To make the students to implement different kinds of searching algorithms like linear search and binary search etc.

OUTCOMES:

At the end of the course student is able to

- 1. Write a C program using various features of c language.
- 2. Build sets of test data in order to evaluate computer programs
- 3. Thoroughly test a program.
- 4. Debug a program.
- 5. Understand the organization of a computer program.
- 6. Understand the process of compiling, linking, and running a program

		1			-	-			-			
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			3						3			
CO2		3	2						3			
CO3			3						3		2	
CO4									3		3	
CO5			3									
CO6									3			

RECOMMENDED SYSTEMS /SOFTWARE REQUREMENTS:

• Intel based desktop PC with ANSI C Compiler and Supporting Editors

Exercise 1:

Write a C program to demonstrate the various operators used in C language.

Exercise 2:

- a) Write a C program to find the roots of a quadratic equation.
- b) Write a C program to find both the largest and smallest number in a list of integers.

Exercise 2:

- a) Write a C program, which takes two integer operands and one operator from the user, performs the specified operation and then prints the result. (Consider the operators +,- ,*, /, % and use Switch Statement)
- b) Write a C Program to find the reverse of a given number.

Exercise 3:

- a) Write a C program to find the sum of individual digits of a positive integer.
- b) Write a C program to generate the first 'n' terms of the Fibonacci sequence.

[Note: 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.]

c) Write a C program to generate all the prime numbers between 1 and n, where 'n' value is given by the user.

[Note: Develop each of the above programs by using different loop constructs supported by C language. (i.e., while, do while and for Loops)]

Exercise 4:

a) Write a C Program to mask the most significant digit of the given number.

b) Write a program which Prints the following patterns

ADADEE		
ARCDER	JFEDCBA	0
ABCDEF	FEDCBA	U
ABCDE	EDCBA	111
ABCD	DCBA	22222
ABC	CBA	3333333
ΑB	ΒA	лллллллл
A	А	

Exercise 5:

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

Exercise 6:

- a) Write a C program to find all the even numbers in the given one dimensional array.
- b) Write a C program to print the elements of an array in reverse order.
- c) Write a C program to perform the following operations:
 i) Addition of Two Matrices
 ii) Multiplication of Two Matrices
 [Note: Use functions to implement the above specified operations]

Exercise 7:

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

- i) To find the factorial of a given integer.
- ii) To find the GCD (greatest common divisor) of two given integers.

Exercise 8:

- a) Write a C Program to solve the Towers of Hanoi problem by using recursive function.
- b) Writea C Program to demonstrate the various storage classes, which are supported by the C language. [i.e., automatic, external, static and register]

Exercise 9:

- a) Write a C Program to demonstrate that, how to pass an entire array as an argument to a function with a suitable example.
- b) Write a C Program to perform various operations on given two strings using string handling functions.

Exercise 10:

- a) Write a C Program to perform various arithmetic operations on pointer variables.
- b) Write a C Program to demonstrate the following parameter passing mechanisms: i) call-by-value ii) call-by-reference

Exercise 11:

- 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 the specified 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 12:

- 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.

REFERENCE BOOKS

- 1. Programming in C, Pradeep Dey, Manas Ghosh, Oxford Heigher Education
- 2. The Spirit of C, an introduction to modern programming, M.Cooper, Jaico Publishing House.
- 3. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publications.
- 4. Computer Basics and C Programming, V. Raja Raman, PHI Publications.

Autonomous CIVIL ENGINEERING

I B.Tech, I-Sem (CE)

Р	С
3	2

RGM-R-2015

(A0391151) ENGINEERING WORKSHOP Common to all Branches

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 labor 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.

OUTCOMES:

At the end of the course student is able to

- A student should know the basic knowledge of various tools and their use in different sections of manufacturing such as fitting, carpentry, tin smithy, welding etc. And basic engineering practices such as plumbing, electrical wiring, electronic circuits, machine shop practice.
- Ability to design and model various basic prototypes in the trade of fitting such as straight fit, v- fit.
- Ability to make various basic prototypes in the trade of tin smithy such as rectangular tray, and open cylinder.
- Ability to perform various basic house wiring techniques such as connecting one lamp with one switch, connecting two lamps with one switch, connecting a fluorescent tube, series wiring, go down wiring.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		1	2	2	1				2		2	1
CO2					2	1			2	2	2	
CO3					2	1			2	2	2	
C04					2	1			2	2	2	

Note: At least two exercises to be done from each trade.

1. TRADES FOR EXERCISES:

A] Carpentry	1. T-Lap Joint	2. Cross Lap Joint
	3. Dovetail Joint	4. Mortise and Tennon Joint
B] Fitting	1. Vee Fit	2. Square Fit
-	3. Half Round Fit	4. Dovetail Fit
C] House Wiring	1. Parallel / Series Connection	n of two/three bulbs
	2. Stair Case wiring	3 Tube Light Wiring
	4. Measurement of Earth Res	istance/Go down Wiring
D] Tin Smithy	1. Rectangular Tray	2. Square Box without lid
	3. Open Scoop	4. Funnel
E] Welding	1. Single V butt joint	2. Lap joint
	3. Double V butt joint	4. T fillet joint.
F] Soldering	1.Soldering & Desoldering Pr	ractice 2. Series Circuit
	3. Parallel Circuit	

2. TRADES FOR DEMONSTRATION:

- a) Plumbing
- b) Machine Shop
- c) Bosch Power Tools

REFERENCE BOOKS:

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

I B.Tech, I-Sem (CE)

P C 3 2

(A0092151) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB Common to all Branches

OBJECTIVES:

- English Language Lab acts as a platform for learning, practicing and producing language skills through interactive lessons and communicative mode of teaching. Communicative method for learning languages combines extensive, high-quality content with flexible and interactive multimedia technology. Learners can act and respond in a variety of ways at their own pace. Through a wide range of activities, a variety of skills are aimed to develop in a learner. A learner needs to communicate: oral and written comprehension, as well as oral and written expression. It also addresses the concepts of grammar, lexicon, phonetics and conjugation.
- ★ To develop language learning through accuracy in grammar
- To enrich the discourse competence, to prepare the learner to be able to produce contextualize written text and speech.
- ✤ To achieve good pronunciation patterns and accent.
- To acquire strategic competence to use both spoken & written language to use in a wide range of communication strategies.

OUTCOMES:

At the end of the course student is able to

- Social interactions, greetings, self-introductions and small talk
- Practice standard pronunciations of through phonetics
- ✤ To present oral and technical presentations
- ✤ Acquire communication skills
- ✤ Learn participate in GDs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1				2	1	2	2	3		2			
CO2	1	1				2	1	2	2	3		2			
CO3	1	1				2	1	2	2	3		2			
CO4	1	1				2	1	2	2	3		2			
CO5	1	1				2	1	2	2	3		2			

UNIT I

Functional English – self Introduction - Greetings – Requests – seeking information Invitations Ice breaking activities

UNIT II

Multi Media Lab Practice Introduction to Phonetics I – Speech sounds –Vowels – Diphthongs – Consonants

UNIT III

Multi Media Lab Practice Phonetics II– Word Accent – Intonation – Rhythm

UNIT IV

Information Transfer – Activity -Description of Technical Objects

UNIT V

Oral Presentations - Activity - JAM

UNIT VI

Group Communication - Activity - GD/Role plays

LICENSED SOFT WARE AVAILABLE IN THE LANGUAGE LAB:

- ✤ K-VAN, SOFTX Technologies: English Language and Communication Skills Soft ware IV.0
- Alania Series, English Mastery, Visual & Media Works: Listening Comprehension Grammar Vocabulary
- Rosetta Stone Soft ware, Visual & Media Works: LSRW Skills
- EL Client, Globerena Technologies: Phonetics Job Skills
- * K-VAN Solutions: Advanced Communication Skills Lab Soft ware.

REFERENCE BOOKS:

- 1. Better English Pronunciation by J.D. O' Connor, Cambridge University Press, 1980
- 2. Longman Dictionary of Contemporary English for Advanced Learners, Pearson Education Ltd.
- 3. Speak with Power and Confidence: Tested Ideas for Becoming a More Powerful Communicator by Patric Collins , 2007
- 4. Professional Communication Skills ,by Praveen S.R. Bhatia (Author), A.K. Jain (Author), A.M. Sheikh (Author),2006

Autonomous CIVIL ENGINEERING

I B.Tech, II-Sem (CE)

Т	С
3+1*	3

RGM-R-2015

(A0005152) PROFESSIONAL ENGLISH-II

(Common to All Branches)

Professional English II has been prescribed with specific objectives of enlightening the learners in the arena of Language competence. The curriculum has been designed to sharpen the skills of the professional students to meet the job tasks and to sustain the global milieu. This skill based curriculum will mould the young learners as competent engineers.

OBJECTIVES:

- Students will be able to read and explore for enrichment works from various genres (novels, plays, poems, essays).
- Students will be able to engage in formal writing assignments that require utilization of all stages of the writing process.
- Students will be able to evaluate their own language competence according to established criteria and rubrics like IELTS / TOEFL
- Students will be acquainted and be able to assess the LSRW skills.

OUTCOMES:

At the end of the course student is able to

- Application of Advance grammar concepts
- Acquisition of English language skills and soft skills based on rubrics like IELTS/TOEFL
- Enriching LSRW through various genres viz. Autobiography
- Practice Technical writing and Documentation
- Understand engineering related concepts like environment and social media

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1										3		3			
CO2	3					2	1	3	2	3		3			
CO3	1						3			3					
CO4	2					3		3	1	3		3			
CO5	1					2		3				3			

UNIT I

Practical English Usage II

- a) Review of Advance Grammar- Active & Passive Structures Reported speech
- b) Introduction to International English Language Testing System (IELTS) Level-2
- Practice Tests IELTS

UNIT II

- a) Listening Skills Active Listening ROAR Technique Note Making
- b) Autobiography A Daughter is born from I am Malala by Malala with Christina Lamb

UNIT III

- a) **Technical Writing** –II Design Led Documentation Online writing E mails Social Media Netiquettes- Project Reports
- b) **Essay** *Green Living by* Neil Chambers

UNIT IV

- a) Concept of Communication Process Principles
- b) **Prose** Immortal Speeches M.K.Gandhi
- UNIT V
 - a) Introduction to Soft Skills Hard Skills vs Soft Skills Team Dynamics
 - b) **Soft Skill** *The Art of Time Management* by Ramesh & Ramesh

UNIT VI

- a) Expression through Art Fine Arts- Ravi Varma Paintings
- b) Project / Case Studies

*Text book Prescribed: Falcon: Rise High, RGMCET Publication

REFERENCE BOOKS

- 1. The Ace of Soft Skills by Gopala Swamy Ramesh & Mahadevan Ramesh, Pearson Education.
- 2. The Basics of Communication by Steven Duck, Sage Publication, New Delhi.
- 3. I am Malala by Malala Yousazai with Christina Lamb, Phoenex, 2014.
- 4. The Art of Public Speaking by Dale Carneige, Cosimo, Inc., 01-Nov-2007.

Autonomous CIVIL ENGINEERING

I B.Tech, II-Sem (CE)

Т	С
3+1*	3

RGM-R-2015

(A0006152) MATHEMATICS-II Common to all Branches

OBJECTIVES:

To make aware students about the importance and symbiosis between mathematics and engineering. Achieve confidence with mathematical tools which an essential weapon in modern Graduate Engineer's Armory. Balance between the development of understanding and mastering of solution techniques with emphasis being on the development of student's ability to use Mathematics with understanding to solve engineering problems by retaining the philosophy learning by doing.

OUTCOMES:

At the end of the course student is able to

- Get knowledge of Matrices, curve fitting, Partial Differential Equations, Numerical Methods , Fourier Series and Transforms and Interpolation
- Understand algebra of Matrices Numerical methods, Interpolation, Curve fitting, Numerical Differentiation and Integration and the solution of Partial Differential Equations.
- Analyze the numerical solutions of Differential Equations in Quantum Mechanics, Electrical Networks etc
- Apply Trapezoidal rule and Simpson's rules in numerical differentiation and integration
- Synthesize problems of one and two dimensional Partial Differential Equations for the wave equation and heat equation

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3														
CO2		3													
CO3		2													
CO4					3										
CO5			2												

UNIT – I

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

UNIT – II

Vector Differentiation:Introduction of Vector differentiation -Scalar and vector point functions-Gradient of scalar function– Directional derivatives- Divergence and curl of a vector function- properties of Grad, Div and Curl.

UNIT – III

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.

UNIT – IV

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

UNIT – V

Fourier integral theorem (statement only) – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms.

UNIT – VI

Z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

TEXT BOOKS:

- 1. Advanced Engineering Mathematics By Erwin Kreyszig.
- 2. Advanced Engineering Mathematics By R.K. Jain and S.R.K. Iyengar, Narosa Publications.

- 1. A Text Book of Engineering Mathematics, Vol 1, T.K.V. Iyengar, B. Krishna Gandhi and Others S. Chand & Company.
- 2. Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.
- 3. A Text Book of Engineering Mathematics, Thomson Book Collection.
- 4. Engineering Mathematics BySrimantha Pal et.al. Oxford University Press.
- 5. Engineering Mathematics, SarveswaraRaoKoneru, Universities Press.

Autonomous CIVIL ENGINEERING

I B.Tech, II-Sem (CE)

Т	С
3+1*	3

RGM-R-2015

(A0007152) MATERIAL PHYSICS Common to CE and ME

OBJECTIVES:

- The MaterialPhysics is designed to meet the educational needs of each student and to provide the foundation for future career development.
- To provide students with a broad education required to recognize, understand, and further the evolving role that materials science plays in society.
- To prepare students for careers in materials physics and engineering, or in fields that require an understanding of materials, by providing a broad, fundamental view of materials as well as a solid foundation in science and engineering.
- To identify important scientific and engineering problems related to materials, and then design systems and processes as well as perform relevant experiments and interpret data to aid the solution of these problems;
- To understand and appreciate materials research and its application in advancing a wide range of established and emerging technologies.

OUTCOMES:

At the end of the course student is able to

- Identify engineering material structures like Si, Ge etc. using the concepts of crystal structures.
- Understand the origin of resistance and band structures with the study of conductors.
- * Know the thermal conductivity and expansion of conductors.
- Apply the concepts of magnetism, dielectric and superconductivity in electrical machines, inductors, capacitors, magnets etc.
- Motivate towards new engineering materials whose behavior of the materials is different than conventional.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3		1	1										1
CO2	3		1												
CO3	3			1											
CO4			3		2										2
CO5	1		1		3		1								1

UNIT I

CRYSTAL PHYSICS: Classification of solids - Lattice – Space lattice - Basis- Crystal Structure - Unit cell – Primitive cell – crystal systems - Bravais lattice –Atomic radius – Coordination number – Packing factor for SC, BCC, FCC structures – NaCl, diamond and graphite structures - Lattice planes – Miller indices – inter planar spacing in a cubic lattice – X-Ray Diffraction - Bragg's law – Powder method of crystal structure determination - Lattice defects – Qualitative ideas of point, line, surface and volume defects - problems.

UNIT II

CONDUCTING MATERIALS: Conductors – classical free electron theory of metals – Drift Velocity -Electrical and thermal conductivity – Quantum theory – Fermi energy – Fermi level - Effect of temperature on Fermi Function - Fermi distribution function – Sources of electrical resistivity – Kroning-Penney model (qualitative results-no derivation) – Energy bands – classification of materials - problems.

UNIT III

THERMAL AND SEMICONDUCTING PROPERTIES: Introduction - Specific Heat of Solids – Einstein Model – Debye Model – Lattice Vibrations – Phonons – Thermal Conductivity.

Introduction - Intrinsic semiconductor – extrinsic semiconductors – Drift and diffusion – Einstein relation - Hall effect – Determination of Hall coefficient – Applications - Basic Ideas of Compound Semiconductors (II-VI & III-V).

UNIT IV

MAGNETIC AND SUPERCONDUCTING PROPERTIES: Terms and definitions - Origin of magnetic moment – Bohr magneton – Dia and para magnetism – Ferromagnetism –Hysteresis – soft and hard magnetic materials – anti ferromagnetic materials – Ferrites – applications - problems.

Introduction to superconductors - Properties of a superconductor - Meissner's effect – London penetration depth -Type of superconductors– BCS theory of Superconductivity (Qualitative) – Applications of superconductors - problems.

UNIT V

DIELECTRIC PROPERTIES: Matter polarization and relative permittivity: definition - dipole moment and polarization vector P - polarization mechanisms: electronic, ionic, orientational, interfacial and total polarization – frequency dependence - Lorentz field and Clausius-Mossotti equation - ferroelectricity - BaTiO₃– applications – problems.

UNIT VI

MODERN ENGINEERING MATERIALS: Nanomaterials: Introduction - Properties - synthesis – ball milling -solgel - applications.

Carbon nanotubes: introduction – types of CNTs - synthesis – chemical vapor deposition – properties and applications.

Metallic glasses – shape memory alloys (one way, two way) – applications.

- 1. Charles Kittel"Introduction to Solid State Physics", John Wiley & sons, 7th edition, Singapore.
- 2. Ali Omer, "Elementary Solid State physics", Person Publications 5th Edition, New Delhi.
- 3. M.N. Avadhanulu and PG Kshirsagar, "A Textbook of Engineering Physics", S.Chand and company, Ltd., New Delhi, 2014.
- 4. D. K. Bhattacharya and PoonamTandon, "Engineering Physics", Oxford University Press, 2015.
- 5. Srivastava, "Elements of Solid State Physics", PHI, New Delhi.
- 6. Charles P. Poole and Frank J. Ownen, "Introduction to Nanotechnology", Wiley India.
- 7. S.P.Basavaraju, "Applied Physics", Subhas Stores, Bangalore.
- 8. M.Ratner & D. Ratner "Nanotechnology", Pearson Ed, New Delhi.

Autonomous CIVIL ENGINEERING

I B.Tech, II-Sem (CE)

T C 3+1* 3

(A0502152) DATA STRUCTURES THROUGH C Common to all Branches

OBJECTIVES:

- ✤ To make students aware about structures and unions in C language.
- To provide exposure on various searching and sorting techniques.
- To provide exposure on various data structures like stacks, queues, circular queues and linked lists etc.,
- To develop solutions for various problems by using C Programming Language by students.

OUTCOMES:

At the end of the course student is able to

- Understand the concepts of structures and unions.
- Perform operations on files.
- Understand the concepts of data structure and implement various data structures such as stacks, queues.
- Implement linked list data structure.
- Understand sorting and searching techniques.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2		2	1						1			
CO2	1	2	1		2	2						1			
CO3	3	2	2		3	2									
CO4	1	3	1	1								2			
CO5	1	2	3		1	1		1				2			

UNIT I

STRUCTURE AND UNIONS IN C LANGUAGE: Structures - Introduction, Features of Structures. Declaration and Initialization of Structures, Accessing structure members, structure initialization. Nested Structures, Array of Structures, Arrays within structures and Pointers to Structures, Structures and Functions, Bit Fields, Unions, Union of Structures. Example Programs on the topics mentioned above.

UNIT II

FILE INPUT/OUTPUT: Introduction, Types of Files, File I/O Operations- High level I/O functions- Open & Close a file, Read and Write data into a file, Searching data in the file, Error handling during I/O operations on files. Command Line Arguments, Applications of Command Line Arguments. Example Programs on the topics covered in this unit.

UNIT III

INTRODUCTION TO DATA STRUCTURES: classification of data structures, dynamic memory allocation functions in C language.

STACKS: Definition, Various representation methods, operations on stacks and their implementation in C language, applications of stacks.

UNIT IV

QUEUES: Definition, Various representation methods, operations on queues and their implementation in C language, applications of queues. Circular queues- operations on circular queues and their implementation in C language.

UNIT V

LINKED LISTS: Definition, Various representation methods, operations on linked lists and their implementation in C language.

UNIT VI

SEARCHINGAND SORTING TECHNIQUES:

Searching Techniques- Linear search and Binary Search Techniques.

Sorting techniques- Bubble Sort, Selection Sort, Quick Sort, Insertion Sort, and Merge Sort. Implementation of all the above mentioned techniques in C language and trace them by giving different test data.

TEXT BOOKS:

- 1. Programming in C,Pradeep Dey, Manas Ghosh, oxford Heigher Education
- 2. Computer programming and Data Structures, E.Balaguruswamy, Tata McGraw Hill. 2009 revised edition.
- 3. The C Programming Language, Brian W.Kerninghan, Dennis M.Ritchie
- 4. Programming in C , Dr. N. Uday Bhaskar, Winger publications

- 1. Let us C Yeshwanthkanetkar, 8th Edition.BPB Publications
- 2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
- 3. Data Structures using C A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI, Eighth Edition.
- 4. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

I B.Tech, II-Sem (CE)

T C 3+3* 3

(A0301152) ENGINEERING DRAWING

(Common to all branches)

OBJECTIVES:

This course is to introduce the basic principles of engineering mechanics with emphasis on analysis and application to practical engineering problems.

OUTCOMES:

At the end of the course student is able to

- Draw different engineering curves and know their applications.
- Draw orthographic projections of different objects.
- Visualize three dimensional objects and draw isometric projections.
- ♦ Use techniques and able to interpret the drawing in the engineering field.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		1		3										
CO2	1	1	3		3	1									
CO3	1	1	3		3	1									
CO4	1	1	2		3					1	1				

UNIT-I

Polygons-Construction of Regular Polygons using given length of a side; Conic sections- Ellipse- Arcs of Circles and Oblong Methods, Construction of Parabola and Hyperbola by eccentricity method only.

UNIT-II

Introduction to Orthographic Projections- Projections of Points-Projections of Straight Lines parallel to both planes; Projections of Straight Lines-Parallel to one and inclined to other plane, inclined to both planes, determination of true lengths, angle of inclinations.

UNIT-III

Projections of Planes- Regular Planes Perpendicular / Parallel to one Reference, Plane and inclined to other Reference Plane.

UNIT-IV

Projections of Solids-Prisms, pyramids, cones and Cylinders with the axis inclined to one Plane.

UNIT-V

Section of solids: Sectioning of prism, pyramid, cone and cylinder– sectional view – true shape. Solids in simple position and cutting plane inclined to one reference plane only.

Development of surface of solids: Development of truncated prism, pyramid, cone and cylinder – frustum of cone and pyramid

UNIT-VI

Conversion of Isometric Views to Orthographic Views/Projections-Conversion of Orthographic Views to Isometric Projections and Views.

TEXT BOOK:

- 1. Engineering Drawing by N.D. Bhatt, Chariot Publications.
- 2. Engineering Drawing and Graphics, Venugopal/New age publications.

REFERENCE BOOKS:

- 1. Engineering Drawing. K.L Narayana, P. Kannaiah, Scitech Publications.
- 2. Engineering Drawing, B.V.R Gupta, J.K. Publishers.
- 3. Engineering Drawing by M.B. Shah and B.C. Rana, Pearson Publishers.
- 4. Engineering Drawing, Johle, Tata Mc Graw Hill.
- 5. K.V. Natarajan, 'A text book of Engineering Graphics', Dhanalakshmi publishers, Chennai (2006).

Autonomous CIVIL ENGINEERING

I B.Tech, II-Sem (CE)

T C 3+1* 3

RGM-R-2015

(A0102152) APPLIED MECHANICS- II

OBJECTIVES:

At the end of the course,

- The student should understand the basic principles of mechanics applicable to rigid bodies in equilibrium and the kinematics and kinetics of particle motion.
- The student should be able to apply these principles to the solution of a variety of practical problems and be able to employ their knowledge to solve more complicated problems and study the affect of problem parameters.
- The student should be prepared to continue the study of the dynamics of rigid bodies and the mechanics of solids and fluids.

OUTCOMES:

At the end of the course student is able to

- Understand and find mass moment of inertia of composite bodies
- Understand shear force, bending moment & draw SFD, BMD for given structural member
- Understand and find motion of particle or rigid body under different types of motion
- Understand D'Alembert principle, equations of motion and find forces or motion using equations of motion
- Understand work –energy method, impulse-momentum method, free vibrations and apply the concepts to solve problems

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1										3	2	1
CO2	3	3	2										3	2	1
CO3	3	3	1										3	2	1
CO4	3	3	2										3	2	1
CO5	3	3	2										3	2	1

UNIT I

MASS MOMENT OF INERTIA: Moment of Inertia of masses- Radius of Gyration- Transfer Formula for Mass moment of Inertia- Mass Moment of Inertial by Integration- Moment of Inertia of Composite Bodies.

UNIT II

SHEAR AND BENDING MOMENT IN BEAMS: Introduction-Definition of Shear Force & Bending Moment-Relations between Load, Shear and Bending Moment- Shear and Moment Equations and Diagrams.

UNIT III

KINEMATICS OF PARTICLES: Introduction – Motion of a particle- Rectilinear motion- Motion curves-Rectangular components of Curvilinear motion- Normal and Tangential components of acceleration- Radial and Transverse components- Cylindrical coordinates.

KINEMATICS OF RIGID BODIES: Types of Rigid Body motion- Angular motion-Fixed axis Rotation-Definition and Analysis of Plane Motion-Application of Kinematic Equations-Instant Center and Instantaneous Axis of Rotation.

UNIT IV

KINETICS OF PARTICLES: General Principles of Dynamics- -Newton's laws of motion for a particle-D'Alember's Principle-Motion of mass center-Moment effect of external forces- Translational Analysis as particle- Translation – Analysis as a Rigid Body.

KINETICS OF RIGID BODIES: Equations of Plane Motion- Fixed Axis Rotation- Rolling Bodies

UNIT V

WORK ENERGY METHOD: Work Energy equation for Translation- Interpretation and Computation of Work- Work Energy Applied to Particle Motion- Power -Efficiency – Work Energy Applied to Connected Systems, Fixed Axis Rotation and Plane Motion.- Virtual Work.

IMPULSE AND MOMENTUM: Linear Impulse- Momentum –Dynamic Action of Jet Streams- Conservation of Linear Momentum – Elastic Impact – Impulse Momentum in Plane Motion- Satellite Motion- Introduction to Gyroscopic Action.

UNIT VI

MECHANICAL VIBRATIONS: Definitions, basic concepts, Simple harmonic motion - Free Vibrations - Simple, Compound and Torsional Pendulums - Simple problems-Free Vibrations Without Damping General Case.

READING:

- 1. Engineering Mechanics, Fedrinand L.Singer Harper Collins Publishers India.
- 2. Engineering Mechanics, Shames & Rao Pearson Education.
- 3. Engineering Mechanics -by Timoshenko
- 4. Engineering Mechanics-Statics and dynamics, A. Nelson, Tata McGraw-Hill Company..

Autonomous CIVIL ENGINEERING

I B.Tech, II-Sem (CE)

P C 3 2

RGM-R-2015

(A0093152) PHYSICS LAB Common to all Branches

OBJECTIVES:

- 1. Providing an opportunity to develop and hone experimental skills, particularly as they pertain to scientific and technical knowledge
- 2. Providing a solid grounding in the methods of scientific and research inquiry,
- 3. Apply the scientific method to experiments in the laboratory.
- 4. To create curiosity in research methods by the experiments Hall effect, four pobe conductivity, laser diffraction etc.

OUTCOMES:

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

- Identify type of extrinsic semiconductors with the use of Hall effect experiment.
- Analyze four probe conductivity experiment in the determination of bandgap of the semiconductors.
- Understand the electromagnetic spectrum in the dispersive power experiment.
- Apply the concept of interference and diffraction in LASER wavelength determination with the use of Grating.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1		1							1
CO2	1		2	1								
CO3	2				1							
CO4	2	1		1	2							1

List of experiments (Any10 Experiments)

- 1. Newton's rings
- 2. Determination of thickness of a thin film
- 3. Spectrometer Transmission grating
- 4. Determination of wavelength of a Sodium light Normal Incidence
- 5. Dispersive power of a prism spectrometer
- 6. Laser experiment: wavelength determination using grating
- 7. Laser experiment: particle size determination
- 8. Determination of numerical aperture of an optical fiber
- 9. Field along the axis of coil carrying current Stewart Gee's method
- 10. Determination of rigidity modulus Torsional Pendulum
- 11. Determination of Band gap of Si or Ge Four probe method
- 12. Study of B H Curve.
- 13. Determination of Charge density and Hall coefficient or magnetic flux density Hall effect.
- 14. Study of Solar I-V characteristics
- 15. Measurement of Dielectric constant

Autonomous CIVIL ENGINEERING

I B.Tech, II-Sem (CE)

P C 3 2

RGM-R-2015

(A0592152) DATA STRUCTURES THROUGH C LAB

(Common to All Branches)

OBJECTIVES:

- To introduce different constructs of C language like structures and unions to the students to solve various kinds of problems.
- To introduce different types of linear data structures like stacks, queues, circular queues and linked lists etc.
- To make the students to implement different kinds of sorting algorithms like selection sort, bubble sort, insertion sort, and quick sort and merge sort etc.
- To make the students to implement different kinds of searching algorithms like linear search and binary search etc.
- ✤ To implement various searching and sorting techniques

OUTCOMES:

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

- To understand how to develop C programs to solve various kinds of problems by using different C programming concepts like structures and unions.
- To develop programs by performing I/O operations through Files.
- * To implement different linear data structures like stacks, queues, circular queues and linked lists etc.,
- ✤ To implement various searching and sorting techniques.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	1			2		1	2
CO2	2	1	2	2	1	1			2	1	1	1
CO3	2	2	2	2	1	2			2	1	1	3
CO4	3	3	3	2		2			1	1	1	1

RECOMMENDED SYSTEMS /SOFTWARE REQUREMENTS:

• Intel based desktop PC with ANSI C Compiler and Supporting Editors

Exercise 1:

- a) Write a C Program to copy the contents of one structure variable to another structure variable.
- b) Write a C program to implement nested structure to store and display the student information. The structure student contains the field's S.no, name, and date. Date is the nested structure and it contains the fields day, month and year.

Exercise 2:

- a) Write a C program to simulate the multiplication of two fractions by passing individual structure members to a function.
- b) Write a C program to simulate the multiplication of two fractions by passing the whole structure to a function.

Exercise 3:

- a) 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.)

c) Display

b) Write a C program to implement Union Concept.

Exercise 4:

- a) Write a C program which copies last 'n' characters from one file to another.
- b) Write a C program to reverse the first 'n' characters in a file.
- c) Write a C program to merge two files into a third file.

Exercise 5:

Write a C program to implement the following operations on Stack using array representation

a) Push b) Pop

Exercise 6:

Write a C program to implement the following operations on Queue using array representation a) Insert

b) Delete c) Display

Exercise 7:

Write a C program to implement the following operations on Singly Linked list using linked representation a) Insert b) Delete c) Display d) Search

Exercise 8:

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

b) Selection sort c) Insertion sort a) Bubble sort

Exercise 9:

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

Quick Sort b) Merge sort a)

Exercise 10:

Write C program to implement the following searching methods to search an element in a given list of integers b) Binary Search a) Linear Search

REFERENCE BOOKS

- 1. Programming in C, Pradeep Dey, Manas Ghosh, Oxford Heigher Education
- 2. Computer programming and Data Structures, E.Balaguruswamy, Tata Mc Graw Hill. 2009 revised edition.
- 3. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publications.

Autonomous CIVIL ENGINEERING

I B.Tech, II-Sem (CE)

Р	С
3	2

RGM-R-2015

(A1291152) IT WORKSHOP (Common to All Branches)

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. It enables the students to understand and fix the common hardware, software issues & makes the students to install either Windows or UNIX based Operating system in the machines.
- Enable students to understand how computers work, different types of computers, functions of applications, input and data storage devices, different operating systems, ethics, data communications, and systems analysis and design
- It makes the students to understand and use the common office suite tools like word, excel etc effectively in their daily usage.
- * To ensure the students to understand the basic networking concepts like IP Address etc

OUTCOMES:

By the end of module students will be expected to demonstrate

- PC Hardware- introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer. In addition hardware and software level troubleshooting process, tips and tricks would be covered. The students should work on working PC to disassemble and assemble to working condition. Students are suggested to work similar tasks in the Laptop scenario wherever possible.
- To do installation of system software like MS Widows and Linux and the required device drivers.
- Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively 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 and power point presentations using the Microsoft suite of office tools.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		2								
CO2	2	2		2								
CO3	2	2								3		
CO4	2	2		2	3							

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

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

WORD

Exercise 7 - Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007,2010/ equivalent tool word: Importance of LaTeX and MS office 2007,2010/ equivalent tool Word as word Processors, Details of the four tasks and features that would be covered in each. Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 1-Task IV: Using 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 Word.

INTRODUCTION TO LATEX

EXCEL

Exercise 8 - Excel Orientation: The mentor needs to tell the importance of MS office 2007,2010/ equivalent 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-Task IV: Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text, Formulas, Functions

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 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 antivirus software, configure their personal firewall and windows update on their computer.

- 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 18th 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 Ken Quamme. CISCO Press, Pearson Education.

Autonomous CIVIL ENGINEERING

I B.Tech, II-Sem (CE)

P C 3 2

RGM-R-2015

(A0191152) APPLIED MECHANICS LAB

OBJECTIVE:

- ✤ To know different types of force systems and finding their resultant.
- \checkmark To understand friction between the two contact surfaces.
- ✤ To understand the concept of moments and couple.
- ✤ To understand the working of simple machines.

OUTCOMES:

At the end of the course student is able to

- Find the resultant of coplanar concurrent systems.
- Determine the coefficient of friction present between contact surfaces.
- Determine the support reactions for the given beam.
- ✤ Determine the moment of inertia of rotary masses.
- * Find the efficiency, mechanical advantage and velocity ratio of weight lifting machines

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1										3	1	2
CO2	3	3	1										3	1	2
CO3	3	3	2										3	1	2
CO4	3	3	1										3	1	2
CO5	3	3	2										3	1	2
Avg.	3	3	1										3	1	2

LIST OF EXPERIMENTS

- 1. To verify the polygon law of coplanar Forces for a concurrent force system.
- 2. Verification of Lamis Theorem.
- 3. To find experimentally the reactions at the supports of a simply supported beam and verify the same with analytical values.
- 4. Verification of force transmitted by members of given truss.
- 5. To determine the coefficient of static friction between two surfaces.
- 6. To determine the Co-efficient of Friction for different materials.
- 7. To verify the principle of moments using the bell crank lever apparatus.
- 8. To determine the coefficient of friction between the threads of the screw jack.
- 9. To find the moment of Inertia of a flywheel.
- 10. To determine the Mechanical advantage, Velocity ratio and Mechanical efficiency of the simple wheel & Axle.
- 11. To determine the Mechanical advantage, Velocity ratio and Mechanical efficiency of a worm and worm wheel.
- 12. To find the moment of inertia of a compound pendulum.

Autonomous CIVIL ENGINEERING

II B.Tech, I-Sem (CE)

 $\begin{array}{ccc} T & C \\ 3+1^* & 3 \end{array}$

RGM-R-2015

(A0015153)MATHEMATICAL METHODS

(Common to CE, ECE, EEE, IT & ME)

OBJECTIVES:

To make aware students about the importance and symbiosis between mathematics and engineering. Achieve confidence with mathematical tools which an essential weapon in modern Graduate Engineer's Armory. Balance between the development of understanding and mastering of solution techniques with emphasis being on the development of student's ability to use Mathematics with understanding to solve engineering problems by retaining the philosophy learning by doing.

OUTCOMES:

At the end of the course student is able to

- Get knowledge of algebra of Matrices, curve fitting, Partial Differential Equations and Numerical Methods to solve various Engineering Problems.(PO1)
- Understand Numerical methods including the study of iterative solutions of equations, interpolation, curve fitting, numerical differentiation and integration and the solution of ordinary differential equations.(PO2)
- Analyze the numerical solutions of ODE's to various real time problems in quantum mechanics, electrical networks etc.(PO2)
- Apply Trapezoidal rule and Simpson's rules in numerical differentiation and integration (PO5)
- Synthesize problems of one and two dimensional Partial Differential Equations for the wave equation, heat equation, Laplace's equation subject to simple boundary conditions.(PO3)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1				1						1	
CO2		2				1						
CO3		2										
CO4					2					1		
CO5			2									

UNIT – I

Matrices: Elementary row transformations – Rank – Echelon form, Normal form – Solutions of Linear System of Homogenous and Non Homogeneous equations

Eigen Values, Eigen vectors – Properties. Cayley – Hamilton Theorem – Inverse and powers of a matrix by Cayley–Hamilton theorem

UNIT – II

Real matrices - Symmetric, skew - Symmetric, orthogonal matrices.

Complex matrices:Hermitian, Skew-Hermitian and Unitary matrices – Eigen values and Eigen vectors and their properties. Quadratic forms –Linear Transformation – Reduction of quadratic form to canonical form and their nature(Signature and Index).

UNIT – III

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

Interpolation: Introduction – Finite differences – Forward Differences – backward Differences –Newton's forward and backward difference formulae for interpolation – Lagrange's Interpolation formula.

$\mathbf{UNIT} - \mathbf{IV}$

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.

UNIT – V

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Method- Milne's Predictor-Corrector Method.

UNIT – VI

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Method of separation of variables – Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace equation under initial and boundary conditions

TEXT BOOKS:

- 1. Advanced Engineering Mathematics By Erwin Kreyszig.
- 2. Advanced Engineering Mathematics By R.K. Jain and S.R.K. Iyengar, Narosa Publications.

- 1. A Text Book of Engineering Mathematics, Vol 1, T.K.V. Iyengar, B. Krishna Gandhi and Others S. Chand & Company.
- 2. Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.
- 3. A Text Book of Engineering Mathematics, Thomson Book Collection.
- 4. Engineering Mathematics BySrimantha Pal et.al. Oxford University Press.
- 5. Engineering Mathematics, SarveswaraRaoKoneru, Universities Press.

Autonomous CIVIL ENGINEERING

II-Year, B.Tech I-Sem (CE)

 $\begin{array}{ccc} T & C \\ 3+1^* & 3 \end{array}$

RGM-R-2015

(A0201153) ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to ME& CE)

OBJECTIVE:

- This course introduces the basic concepts in electric circuits and networks
- This course also introduces the working principles of different types of AC and DC motors, Generators and Transformers.
- * It also helps to study the operating principles of electrical measuring instruments and their working
- ✤ To understand the fundamental principles of basic electronic devices
- * To provide theoretical prerequisites necessary to do lab work on DC machines and AC machines

OUTCOMES:

At the end of the course student is able to

- To know the basic knowledge of conducting materials and electrical circuit parameters
- Understand the principles of dc machines and transformers.
- Analyze the working operation of measuring instruments
- Determine the efficiency of machines, half wave and full wave rectifiers.
- ✤ Able to observe the different tests and calculations of all machines.

Applications of dc machines, transformers, instruments and rectifiers.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	-	-	-	-	2	-	1	2	-	-	-
CO2	3	3	1	2	-	-	-	-	2	-	1	2	-	-	-
CO3	3	1	2	3	-	-	-	-	1	-	2	1	-	-	-
CO4	3	3	2	2	-	-	-	-	2	-	2	2	-	-	-
CO5	3	3	1	2	-	-	-	-	1	-	2	2	-	-	-
CO6	3	1	3	2	-	-	-	-	2	-	1	1	-	-	-
Avg.	3	3	2	2	-	-	-	-	2	-	2	2	-	-	-

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 thevinin'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-Defecting 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.

- 1. Basic Electrical Engineering by Kothari and Nagarath, TMH Publications, 2nd Edition.
- 2. Electronics and Devises by salivahan, TMH Publications

Autonomous CIVIL ENGINEERING

II B.Tech, I-Sem (CE)

T C 3+1* 3

RGM-R-2015

(A0009153) ENVIRONMENTAL SCIENCE

(Common to All Branches)

OBJECTIVES:

- Creating the awareness about environmental problems among people.
- Imparting basic knowledge about the environment and its allied problems.
- Developing an attitude of concern for the environment.
- Motivating public to participate in environment protection and environment improvement.
- Acquiring skills to help the concerned individuals in identifying and solving environmental problems.
- Striving to attain harmony with Nature.
- Environmental education should be compulsory, right from the primary up to the post graduate stage.
- Environmental education should have an interdisciplinary approach by including physical, chemical, biological as well as socio-cultural aspects of the environment. It should build a bridge between biology and technology.
- Environmental education should take into account the historical perspective, the current and the potential historical issues.
- Environmental education should emphasize the importance of sustainable development i.e., economic development without degrading the environment.
- Environmental education should emphasize the necessity of seeking international cooperation in environmental planning.
- Environmental education should lay more stress on practical activities and first hand experiences.

OUTCOMES:

At the end of the course student is able to

- Understand environmental problems arising due to developmental activities.
- Realize the importance of ecosystem and biodiversity for maintain ecological balance.
- ✤ Identify the natural resources and suitable methods for conservation and sustainable development.
- ✤ Identify the environmental pollutants and abatement devices.

* Adopt practices that help in promoting balance in nature by making judicious utilization of recourses.

		1 1			1 1		U			-	03				
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	1	3	2	-	-	-	2	-	-	-
CO2	1	2	-	-	-	-	3	1	2	-	-	2	-	-	-
CO3	1	-	-	-	1	1	3	1	1	-	1	2	-	-	-
CO4	-	1	1	-	2	1	1	1	-	-	1	2	-	-	-
CO5	-	1	1	-	-	-	2	1	-	-		2	-	-	-
Avg.	1	1	1	-	2	1	3	1	2	-	1	2	-	-	-

UNIT I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL SCIENCE: Environment -Definition, scope and importance, Segments of Environment-Importance, Productivity, Aesthetical& Optional values of nature, need for public awareness.

UNIT II

RESOURCES AND UTILIZATION: Renewable and non-renewable resources.

- a) Natural Resources: soil & water sources(salinity intrusion –conflicts of over utilization of water Resources-water logging, Hydro power project-problems), forest & mineral resources Utilization-problems.
- b) Nonconventional resources of energy(Solar Energy, wind energy and their applications)
- c) Chemical fertilizers and pesticides-problems.
- d) Green Revolution-white revolution- blue Revolution.
- e) Non equitable distribution of Resources.

UNIT III

- a) CONCEPTS OF ECO-SYSTEM: Structure and functions of an ecosystem: producers, consumers and decomposers- Interaction between biotic and abiotic factors in an ecosystem- Energy flow and its importance- Trophic levels- food chain- Food web –Ecological Pyramid, Ecological succession
- **b) TYPES OF ECOSYSTEM:** Understanding the types of ecosystem:

(ii) aquatic (fresh water and salt water) with an example of each.

UNIT IV

BIODIVERSITY: Introduction – Definition - genetic, species and ecosystem diversity- Bio-geographical classification of India- Value of biodiversity- Hot-sports of biodiversity- Biodiversity at global, National and local levels- India as a mega diversity nation - Hot-spots of biodiversity- Threats to biodiversity- IUCN Red data book.

Conservation of bio diversity (IN-SITU and EX-SITU conservation)

UNIT V

ENVIRONMENTAL POLLUTION: Introduction - 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

Municipal Solid waste Management: Sources and Disposable methods.

Disaster management: floods, earthquake, cyclone.

UNIT VI

HUMAN POPULATION:

- a) Population and Environment:- Definition of species, community, population; Population growth rate curves, Sex ratio, From unsustainable to sustainable development, Diseases-HIV, Malaria, Diaharia, Cancer.
- b) Human rights, fundamental duties and value education.
- c) Women and child welfare & Family welfare programs.

SOCIAL ISSUES:

- a) Resettlement and rehabilitation of people.
- b) Energy Crisis urban and rural sectors.
- c) Greenhouse effect and global warming.
- d) Climatic changes.
- e) Acid rain.
- f) Ozone layer depletion.
- g) Sustainability- water conservation methods- Rain water harvesting.

TEXT BOOKS:

- 1) Deswal, S and Deswal A., (2004), A Basic Course in Environmental Studies, Dhanpat Rai & Co. Delhi.
- 2) Anubha Kousik and C P Kousik, New age international publishers.
- 3) Garg, S.K and Garg, R., (2006), Ecological and Environmental Studies, Khanna Publishers, Delhi.
- 4) Chauhan, A.S., (2006), Environmental Studies, Jain Brothers, New Delhi

- 1) Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- 2) Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad –380 013, India, Email:mapin@icenet.net (R).
- 3) Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
- 4) Clark R.S., Marine Pollution, Clanderson Press Oxford (TB).
- 5) Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p.
- 6) De A.K., Environmental Chemistry, Wiley Eastern Ltd.

II B.Tech, I-Sem (CE)

T C 3+1* 3

(A0149153) STRENGTH OF MATERIALS – I

Prerequisites: Physics, Mathematics II and Engineering Mechanics.

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

OUTCOMES:

At the end of the course student is able to

- Determine the stresses and strains in the member subjected to axial loading.
- Evaluate the slope and deflection of beams subjected to loads.
- Understand theory of simple bending and determine bending stresses.
- Determine buckling load for compression member.
- Evaluate SF & BM for different types of beams

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3											3	2	1
CO2	2	3											3	2	1
CO3	3	3											3	2	1
CO4	2	3											3	2	1
CO5	2	3											3	2	1
Avg.	2	3											3	2	1

UNIT – I

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

UNIT – II

SHEAR FORCE AND BENDING MOMENT: Definition of beam – Types of beams – Concept of shear force and bending moment – Relation between S.F., B.M and rate of loading at a section of a beam – 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 – Principle of super position.

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.

$\mathbf{UNIT} - \mathbf{IV}$

Deflection Of Beams: Double Integration method. Conjugate Beam method - Calculation of Slope and deflections of Simply Supported Beams, Cantilever Beams and Overhanging Beams

UNIT – V

Torsion Of Circular Shafts: Theory of Pure Torsion in Solid and Hollow circular shafts – Torsional Shear Stresses and angle of twist - transmission of Power.

UNIT – VI

Columns and Struts: Direct and Bending stresses - Kernel of a section - Euler's critical load for columns with ordinary end conditions - Slenderness ratio and effective length of a column -Rankine's Formula - IS Code formula - Critical load of eccentrically loaded columns.

READING:

- 1. Mechanics of Materials by Gere & Thimoshenko
- 2. Mechanics of Solid, by Ferdinand Beer and others Tata Mc.Graw hill Publications 2000.
- 3. Mechanics of Solids by Poppov

II B.Tech, I-Sem (CE)

T C 3+1* 3

RGM-R-2015

(A0103153) GEODETIC ENGINEERING

Prerequisites: None.

OBJECTIVES:

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

OUTCOMES:

At the end of the course student is able to

- Carry out preliminary surveying in the field of civil engineering applications such as structural, highway engineering
- Plan & execute a survey
- Understand the working principles of survey Instruments
- Calculate the angles, heights, distances, areas, volumes and levels of the given structure

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2											2	3	2
CO2	3	3											2	3	2
CO3	3				2								2	3	2
CO4	3	3			2								2	3	2
Avg.	3	3			2								2	3	2

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: Use and applications of prismatic & surveyor compass-Temporary & permanent adjustments-Designation of bearing-Reduced bearing-Fore and back bearing-Determination of included angles from measured bearings.

UNIT – III

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

UNIT – IV

THEODOLITE SURVEYING: The essentials of the transit theodolite, definitions and terms. temporary adjustments, measurement of horizontal angles, measurement of vertical angles. Trigonometric leveling

UNIT - V

TACHEOMETRIC SURVEYING: General, instruments, Different systems of tachometric measurement, Stadia and tangential methods of Tachometry. Distance and Elevation formulae for Staff vertical position.

UNIT – VI

Total station surveying: Definition, Fundamental measurements, horizontal & vertical angle, slope distance, basic calculations-horizontal vertical distance, coordinate calculations.

TEXT BOOKS:

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

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

II B.Tech, I-Sem (CE)

T C 3+1* 3

(A0104153) FLUID MECHANICS

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 aero planes 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, Bernoulli's applications such as pipe flows and flow through orifices, mouthpieces, notches etc.,

OUTCOMES:

At the end of the course student is able to

- ✤ Understand the properties of fluid and fluid statics
- Evaluate hydrostatic forces
- To study the properties of fluid in motion ,analyze forces on fluid through the continuity equation
- ✤ Analyze laminar and turbulent flows
- Compute friction losses in pipe when there is a flow between two places
- Measure the flow in a pipe

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3											2	1	1
CO2	1	3											2	1	1
CO3	3	3											2	1	1
CO4	1	3	1										2	1	1
CO5	2	3	1										2	1	1
CO6	2	3			1								2	1	1
Avg.	2	3	1		1								2	1	1

UNIT – I

INTRODUCTION, and HYDROSTATICS : Dimensions and units – Physical properties of fluids- specific gravity, viscosity, surface tension, Capillarity, 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), Mechanical gauges

UNIT – II

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

UNTI – III

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. Kinetic energy correction factor and momentum correction factor

UNIT – IV

LAMINAR & TURBULENT FLOWS: Reynold's experiment – Relation between Shear Pressure Gradients in Laminar flow; Steady Laminar flow in Circular Pipes – Hagen Poiseuille Law, Laminar Flow between parallel plates; Shear Stresses in Turbulent flow, Hydro dynamically Smooth and Rough Boundaries, Variation of friction factor with Reynold's number – Moody's Chart.

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.

UNIT – VI

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

TEXT BOOKS:

- 1. Hydraulics and Fluid Mechanics Including Hydraulics Machines, P.N.Modi and S.M.Seth, Nineteenth Edition, Standard Book House, New Delhi
- 2. Fluid Mechanics, Frank.M. White (Tata Mc.Grawhill Pvt. Ltd.)

- 1. Fluid Mechanics, http://nptel.ac.in/courses/105101082/
- 2. Fluid Mechanics, http://www.nptel.ac.in/courses/112104118/ui/TOC.htm
- 3. A text of Fluid mechanics and hydraulic machines R.K. Bansal Laxmi Publications (P) ltd., New Delhi
- 4. Fluid Mechanics J.F.Douglas, J.M. Gaserek and J.A.Swaffirld (Longman)
- 5. Fluid Mehanics A.K. Mohanty, Prentice Hall of India Pvt. Ltd., New Delhi
- 6. Introduction to Fluid Machines S.K.Som& G.Biswas (Tata Mc.Grawhill publishers Pvt. Ltd.)
- 7. Introduction to Fluid Machines Edward J. Shaughnessy, Jr, Ira M. Katz and James P. Schaffer, Oxford University Press, New Delhi

II B.Tech, I-Sem (CE)

T C 1+2* 1

(A0010153) APTITUDE ARITHMETIC REASONING AND COMPREHENSION

(Common to All Branches) (Skill Development Course)

OBJECTIVES:

- ✤ To make the students ready to the recruitment drives.
- ✤ To raise the confidence of the students to face the written test of any Company.
- ✤ To train the students regarding employability skills.

OUTCOMES:

At the end of the course student is able to

- Acquire knowledge of Number Systems, Time and Work, Time and Distance, Geometry and Menstruation, Coding, Decoding and Reasoning
- Understand to solve Quadratic Equations, Mixtures & Allegations, Simple Interest, Compound Interest, Permutations & Combinations and Non Verbal Reasoning.
- Analyze Data Interpretation, Data Sufficiency, Probability, Coding, Decoding, Connectives Clocks and Calendars Analytical.
- Apply Verbal and Non Verbal Reasoning to solve Analytical Puzzles, Sequencing, Routes& Networks.
 Synthesize Quantitative Techniques and Data Interpretation for Data Sufficiency.

•	• Synthesize Quantitative reciminques and Data interpretation for Data Sufficiency.														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1						3									
CO2				2											
CO3											2				
CO4										3					
CO5				3											
Avg.				3		3				3	2				

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

- 1. R.S.Agarwal "Quantitative Techniques" S.Chand Series
- 2. Shankuntala Devi "Techniques of Reasoning" S.Chand Series

Autonomous CIVIL ENGINEERING

II B.Tech, I-Sem (CE)

P C 3 2

(A0192153) GEODETIC ENGINEERING LAB – I

Prerequisites: Surveying.

OBJECTIVES:

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

OUTCOMES:

At the end of the course student is able to

- Use conventional surveying tools such as chain/tape, compass, plane table, level in the field of civil engineering applications such as structural plotting and highway profiling
- Apply the procedures involved in field work and to work as a surveying team
- Plan a survey appropriately with the skill to understand the surroundings

* Take accurate measurements, entering in field book, plotting and adjustment of errors

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	-	-	-	2	1	-	-	2	3	3
CO2	3	1	-	-	-	-	-	-	2	1	-	-	2	3	3
CO3	3	1	-	-	-	-	-	-	2	1	-	-	2	3	3
CO4	3	1	-	-	-	-	-	-	2	1	-	-	2	3	3
Avg.	3	1	-	-	-	-	-	-	2	1	-	-	2	3	3

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. Fly levelling (differential levelling)
- 6. An exercise of L.S and C.S and plotting
- 7. Two exercises on contouring.
- 8. Study of Theodolite in detail practice for measurement of horizontal and vertical angles.
- 9. Measurement of horizontal angles by method of repetition.
- 10. Measurement of horizontal angles by method of reiteration.
RGM-R-2015 RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY

Autonomous CIVIL ENGINEERING

II B.Tech, I-Sem (CE)

P C 3 2

(A0193153) STRENGTH OF MATERIALS LAB

Prerequisites: Strength of materials

OBJECTIVES:

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

OUTCOMES:

At the end of the course student is able to

- Determine hardness of metals
- Conduct tension test on spring
- Conduct compression test on spring

Conduct torsion test to determine elastic constants

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	2	1	-	-	1	1	3
CO2	3	3	-	-	-	-	-	-	2	1	-	-	1	1	3
CO3	3	3	-	-	-	-	-	-	2	1	-	-	2	1	3
CO4	3	3	-	-	-	-	-	-	2	1	-	-	2	1	3
Avg	3	3							2	1			2	1	3

EXPERIMENTS

- 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.

READING:

1. Timoshenko and Gere, Mechanics of Materials, CBS Publishers, New Delhi, 1996

II B.Tech, I-Sem (CE)

P C 3 2

(A0291153) ELECTRICAL & ELECTRONICS ENGINEERING LAB (Common to ME & CE)

OBJECTIVE:

- ✤ To experiment and verify the basic electrical and electronic principles.
- ✤ To provide practical exposure to test the performance of DC and AC machines, Transformers
- ✤ It helps to study the characteristics of basic electronics devices

OUTCOMES:

At the end of the course student is able to

- To know the basic knowledge of network theorems and Kirchhoff's laws
- Understand the principles of dc machines and transformers.
- Analyze the working operations of measuring instruments, electrical machines.
- Determine the efficiency of machines, half wave and full wave rectifiers.
- ✤ Able to observe the different tests and calculations of all machines.
- ✤ Applications of dc machines, transformers, instruments and rectifiers.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		-	-	2	-	-	-	3	-	-	-	3	-	-
CO2	3	1	2	-	2	-	-	-	3	-	-	-	3	1	2
CO3	3	3	2	2	1	2	-	-	3	-	2	-	3	3	2
CO4	3	1	1	1	-	1	-	-	3	-	-	-	3	1	1
CO5	3	2	1	2	-	2	-	-	3	-	2	-	3	2	1
CO6	3	2	1	1	2	1	-	-	2	1	-	-	3	2	1
Avg.	3	2	2	2	2	2	-	-	3	1	2	-	3	2	2

Section – A

Electrical Engineering Lab: (Any five experiments)

- 1. Verification of super position theorem
- 2. Verification of thevinin's 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
- 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)

RGM-R-2015 RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY

Autonomous CIVIL ENGINEERING

II B.Tech, II-Sem (CE)

T C 3+1* 3

(A0105154) ENGINEERING GEOLOGY

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.

OUTCOMES:

At the end of the course student is able to

- Understands the role of geology in civil engineering
- * Knowledge in rocks, minerals and select suitable rock for construction
- ✤ Analyse the suitability of site based on geology for dam or tunnel and provides remedial measures if not suitable
- Use the application of seismic and electrical methods to investigate the subsurface and geophysical studies
- ✤ Assess the geological hazards
- Knowledge about earth quake and its effects

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	-	1	-	-	-	-	-	1	1	-
CO2	2	-	2	-	-	-	-	-	-	1	-	-	-	1	2
CO3	-	-	3	-	-	-	1	-	-	-	-	-	-	1	2
CO4	1	3	3	-	-	-	1	-	-	-	-	-	1	1	2
CO5	-	1	1	-	-	-	1	-	-	-	-	-	1	1	-
CO6	1	2	1	-	-	-	1	-	-	-	-	-	1	1	-
Avg	1	2	2	-	-	-	1	-	-	1	-	-	1	1	2

UNIT I

INTRODUCTION: Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

WEATHERING 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, Quartiz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chrorite, 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 un conformities, and joints – their important types. Their importance Insitu 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.

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.

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

REFERENCES:

- 1. Engineering geology by Prabinsingh
- 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.
- 6. Engineering Geology by D.Venkata Reddy, Vikas Publications, New Delhi.

II B.Tech, II-Sem (CE)

T C 3+1* 3

(A0106154) BULDING MATERIALS AND CONSTRUCTION

Prerequisites: None. **OBJECTIVES:**

- The course objective covers various civil engineering materials like stones, brick, tiles, cement, concrete etc.
- To learn about different types of masonry, building components, different types of foundations and green buildings

OUTCOMES:

At the end of the course student is able to

- Understand the importance of various civil engineering materials
- Understand the importance Advanced building materials
- ✤ Idea on the type masonry for construction & identify various building components and foundation
- Understand the needs of green buildings

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	-	-	-	-	-	-	-	-	-	2	1	1
CO2	1	2	-	-	-	-	-	-	-	-	-	-	2	1	1
CO3	1	2	-	-	-	-	-	-	-	-	-	-	2	1	1
CO4	1	2	-	-	-	-	-	-	-	-	-	-	2	1	1
Avg	1	2											2	1	1

UNIT – I

Building stones: Classification of stones- Characteristics of good building stones, important types of building atones, their properties and stones and uses.

Brick & other clay products: Composition of brick-earth, manufacturing process of bricks, characteristics of good building bricks, classification and testing of bricks, special types of bricks and their uses. Types of tiles and their use in buildings. Terracotta, stoneware.

Lime & cement: IS classification of lime and uses, flow diagram of manufacturing process of cements, chemical composition of cement, IS specifications and tests on Portland cement, different types of cements and their uses.

UNIT - II

Wood: Structure- properties- seasoning of timber-Defects in timber. Various types of woods used in buildings.

UNIT - III

Mortar & concrete: Preparation of cement mortar and concrete, proportion of mortars and concrete for different types of works, properties of concrete in plastic and hardened stages, factors affecting strength of concrete, types of concrete and their specific use

UNIT -IV

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

UNIT –V

Steel &aluminum: Types of steel-mild steel, high carbon steel, high strength steel- properties and uses, commercial forms of steel and their uses

$\mathbf{UNIT} - \mathbf{VI}$

Introduction to Green Buildings:General, Definitions, Needs and opportunities, Why make your building Green, Green building Rating system, International Rating systems, The Indian Green Building council green building movement in India, IGBC Green building rating system, levels rating

- 1. Civil engineering Materials and Construction Practices by R.K. GUPTA, Jain Brothers, (New Delhi).
- 2. Civil engineering Materials by S.C. Rangwala, Charotar Publishing House (1992).

II B.Tech, II-Sem (CE)

T C 3+1* 3

(A0107154) STRENGTH OF MATERIALS – II

Prerequisites: Physics, Mathematics II and Engineering Mechanics, strength of materials.

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.

OUTCOMES:

At the end of the course student is able to

- * Knowledge on strength parameters of materials and determine the strength parameters of materials
- Solve the principal stress and principal plane problems
- ✤ Analyse the members subjected to torsion

*	• Unc	lerstan	d the th	neory o	f torsic	on and	stresse	s in spi	rings						
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	-	-	-	-	-	-	-	3	2	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	3	2	-
CO3	1	3	-	-	-	-	-	-	-	-	-	-	3	2	-
CO4	1	2	-	-	-	-	-	-	-	-	-	-	3	2	-
Avg.	2	2											3	2	

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 Lame's theory for thick cylinders – Derivation of Lame'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.

$\mathbf{UNIT} - \mathbf{IV}$

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

UNSYMETRICAL 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.

Shear Centre: Concept of Shear Centre - Shear Centre of various cross sections - Shear flow-Shear lag.

$\mathbf{UNIT} - \mathbf{VI}$

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.

- 1. Mechanics of Materials by Gere & Thimoshenko
- 2. Mechanics of Solid, by Ferdinandp Beer and others Tata Mc.Graw Hill Publications 2000.
- 3. Mechanics of Solids by Poppov
- 4. Strength of materials by R. Subramanian, Oxford university press, New Delhi

II B.Tech, II-Sem (CE)

T C 3+1* 3

(A0108154) HYDRAULICS AND HYRAULIC MACHINERY

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.

OUTCOMES:

At the end of the course student is able to

- Understand boundary layer concept and Compute drag and lift coefficients
- Understand & Design of open channels
- Compute flow profiles in channel transitions and analyze hydraulic transients and to generate modern software like MATLAB
- Apply knowledge of impact of jets to understand and design of hydraulic machines
- Understand & Apply principles of dimensional analysis to design experiments

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3				-	-	-	-	-	-	-	2	3	1
CO2	3	3	3			-	-	-	-	-	-	-	2	3	1
CO3		3			2	-	-	-	-	-	-	-	2	3	1
CO4	3	3	3			-	-	-	-	-	-	-	2	3	1
CO5	3	3	3			-	-	-	-	-	-	-	2	3	1
Avg.	3	3	3		2	-	-	-	-	-	-	-	2	3	1

UNIT I

BOUNDARY LAYER FLOW: Boundary layer – concepts, Characteristics of boundary layer along a thin flat plate, Von Karman momentum integral equation (No derivation); Forces on Submerged bodies: Drag & Lift force (Concepts and problems), Magnus effect.

UNIT – II

OPEN CHANNEL FLOW: Types of flows - Type of channels – Velocity distribution – Energy and momentum correction factors – Chezy's, Manning's; and Bazin formulae for uniform flow – Most Economical sections. Critical flow: Specific energy-critical depth – computation of critical depth – critical sub-critical and super critical flows; Non uniform flow-Dynamic equation for Gradual Varied Flow, , hydraulic jump, energy dissipation.

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 efficienciesclassification 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 characteristicsgeometric 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:

- 1. Hydraulics and Fluid Mechanics Including Hydraulics Machines, P.N.Modi and S.M.Seth, Nineteenth Edition, Standard Book House,, New Delhi
- 2. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal Laxmi Publications (P) ltd., New Delhi

REFERENCES:

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

II B.Tech, II-Sem (CE)

T C 3+1* 3

(A0109154) STRUCTURAL ANALYSIS – I

Prerequisites: Mechanics of Materials. **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.

OUTCOMES:

At the end of the course student is able to

- Understand fundamental concepts, theorems & derivations for analysis of structures.
- Analyses of beams by using various conventional methods.
- Draw influence line diagrams for beams and indeterminate structures.
- Analyses of a structures for moving loads

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	2	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	3	2	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-	3	2	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	3	2	-
Avg.	3	3											3	2	

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

- 1. Analysis of Structures-Vol I & Vol II by V.N. Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.
- 2. Wang C.K. Intermediate Structural Analaysis Tata Mc Graw Hill Publishers, 2010.
- 3. Theory of structures by Rammamrutham

II B.Tech, II-Sem (CE)

T C 3+1* 3

(A0110154) CONCERETE TECHNOLOGY

Prerequisites: Civil Engineering Materials. **OBJECTIVES:**

- The course objective of covers the hardened concrete properties & testing, mix design and special concretes.
- To learn basics of construction technology, excavation techniques & project planning using PERT & CPM.

OUTCOMES:

At the end of the course student is able to

- ✤ Identify quality control tests on concrete making materials
- Understand the behavior of fresh and hardened concrete
- Design concrete mixes as Per IS and ACI Codes
- Understand the need for special concretes
- ✤ Identify the equipment used in construction
- Prepare schedule of activities in a construction project.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3			-		-	-	-	-	-	-	-	3	1	2
CO2	3			-		-	-	-	-	-	-	-	3	1	2
CO3	3	3	3	-		-	-	-	-	-	-	-	3	1	2
CO4	3	-		-		-	-	-	-	-	-	-	3	1	2
CO5	2	-		-	2	-	-	-	-	-	-	-	3	1	2
CO6	3			-		-	-	-	3	-	3	-	3	1	2
Avg.	3	3	3	-	2	-	-	-	3	-	3	-	3	1	2

UNIT I

FRESH CONCRETE: Properties of fresh concrete- Workability – different tests of workability- Factors influencing workability compaction, finishing, curing.

UNIT II

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

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

UNIT III

DURABILITY: Factors influencing durability – Chemical effects on concrete- Carbonation, Sulphate attack, Chloride attack.

UNIT IV

CREEP OF CONCRETE: – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

UNIT V

MIX DESIGN: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – ACI method & IS 10262 method

UNIT VI

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

- 1. Properties of Concrete AM Nevelli 5th Ed, Prentice Hall Publishers, 2012.
- 2. Concrete Technology M. S. Shetty S Chand Co., Publishers 2006.
- 3. Concrete Technology M. L. Gambhir Tata Mc Graw Hill Publishers 2012.

RGM-R-2015 RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY

Autonomous CIVIL ENGINEERING

II B.Tech, II-Sem (CE)

T C 1+2* 1

(A0011154) COPORATE MANAGEMENT SKILLS Common to all Branches

(Skill Development Course)

OBJECTIVES:

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

OUTCOMES:

At the end of the course student is able to

- Know how to communicate fluently
- Obtain confidence of the student with respect to the interpersonal communication.
- Cultivate the team culture and teamwork.
- Tackle the challenges of group discussion and personal interview
- ✤ Know how to communicate fluently

СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	3	-	1	-	-	-
CO2	3	-	-	-	-	-	3	-	-	1	-	-	-	-	-
CO3	3	-	-	-	-	-	-	2	3	1	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	3	2	-	3	-	-	-
CO5	3	-	-	-	-	-	-	-		3	-	1	-	-	-
Avg.	3	-	-	-	-	-	3	2	3	2	-	2	-	-	-

UNIT-1:

Concept of Communication: Significance-Functions of Communication-Process-Different types of Communication-Essentials of good communication-Channels of communication-Formal and informal communication networks.

UNIT-2:

Types of Communication: Oral Communication-Tips to make oral communication effective-Merits and Demerits of oral communication-Written Communication-Steps in Writing-Merits and Demerits of written communication-Non verbal communication and Different types in it.

UNIT-3:

Barriers to Communication: Types of barriers-Technological, Sociopsychological-How to overcome the barriers-Different communication styles and models.

UNIT-4:

Interviews: Resume preparation, Interview Process-Types-Common mistakes in interview- Preparation for interviewee.

UNIT-5:

Emotional Intelligence: Felt Vs Displayed emotions-Emotional dimensions- External constraints on emotion-Gender and emotion-Importance of emotional intelligence.

UNIT-6:

Personality and Perception: Determinants of personality-Theories of personality-Components of perception-Factors influencing the perception process-Johari Window.

REFERENCE BOOKS:

- 1. Business communication Meenakshi Raman oxford university prof
- 2. Business communication Lalitha Ramakrishna
- 3. Business communication Hudson,5 /E,Jaico publication
- 4. Effective communication Harward Business school, Harward Business review no 1214
- 5. Management and organization Behaviour by P.Subbarao

II B.Tech, II-Sem (CE)

C 2

Р

3

(A0194154) FLUID MECHANICS, HYDRAULICS AND HYDRAULIC MACHINES LAB

OBJECTIVES:

- Provides practical knowledge to understand fluid mechanics concepts
- Provides practical knowledge to understand fluid machines

OUTCOMES:

At the end of the course student is able to

- Calibrate flow measuring devices used in pipes, channels and tanks
- Determine fluid flow properties
- Characterize laminar and turbulent flows
- Determine the performance characteristics of various fluid machines like pumps, turbines etc.
- Establish the specific energy curve
- Determine Energy loss in Hydraulic jump

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	-	-		-	-	-	3	1		-	-	-	3
CO2	1	3	-	-		-	-	-	3	1		-	-	-	3
CO3	1	3	-	-		-	-	-	3	1		-	-	-	3
CO4	2	3	-	-		-	-	-	3	1		-	-	-	3
CO5	2	3	-	-	3	-	-	-	3	1	2	-	-	-	3
CO6	2	3	-	-	3	-	-	-	3	1	2	-	-	-	3

LIST OF EXPERIMENTS:

- 1. Determination of Coefficient of discharge for 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. Determination of Coefficient of discharge for 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.
- 13. Incipient motion of sand bed particles

RGM-R-2015 RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY

Autonomous CIVIL ENGINEERING

II B.Tech, II-Sem (CE)

C 2

Р

3

(A0195154) GEODETIC ENGINEERING LAB – II

Prerequisites: Surveying.

OBJECTIVES:

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

OUTCOMES:

At the end of the course student is able to

- ✤ Use the theodolite along with chain/tape, compass on the field
- Apply geometric and trigonometric principles of basic surveying calculations
- Plan a survey, taking accurate measurements, field booking, plotting and adjustment of errors
- Apply field procedures in basic types of surveys, as part of a surveying team

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	-	-	-	2	1	-	-	2	3	3
CO2	3	1	-	-	-	-	-	-	2	1	-	-	2	3	3
CO3	3	1	-	-	-	-	-	-	2	1	-	-	2	3	3
CO4	3	1	-	-	-	-	-	-	2	1	-	-	2	3	3
Avg.	3	1	-	-	-	-	-	-	2	1	-	-	2	3	3

LIST OF EXERCISES:

- 1. Trigonometric Levelling 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, Difference in height between two inaccessible points using total stations
- 11. Learning the use of GPS
- 12. Learning the use of DGPS

II B.Tech, II-Sem (CE)

C 2

Р

3

(A0196154) BUILDING PLANNING & DRAWING LAB

Prerequisites: Engineering Graphics. **OBJECTIVES:**

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

OUTCOMES:

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

- Explain functional planning of buildings and illustrate conventional signs and symbols
- Differentiate types of doors, windows and stair case.
- Draw the plan, section and elevation of different buildings on a drawing sheet.
- Draw the plan, section and elevation of different buildings using AUTOCAD
- Draw plumbing and Electrical fitting for various types of buildings
- Improve their spatial imagination skills to develop new products

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1				2	1						3	1	3
CO2	3	1					1						3	1	3
CO3	3	1			3		1						3	1	3
CO4	3	1			3		1						3	1	3
CO5	3	1			3		1						3	1	3
CO6	3	1			3	3	1						3	1	3

- 1. Symbols used in Civil Engineering drawing
- 2. Doors, Windows and staircases.
- 3. Plumbing & Electrical fitting drawing.
- 4. Comprehensive Drawing of Residential building (Layout, plan, elevation & sectional elevation, plumbing & electrical fittings)
- 5. Preparation of Layout planning of different civil engg. Projects.
- 6. Preparation of lay out planning of school buildings, office buildings, hospitals, auditoriums and other buildings

REFERENCE:

- 1. Building planning & Drawings by DR.N. Kumara swamy
- 2. Building planning & Drawings by Sha & Khale

III B.Tech, I-Sem (CE)

T C 3+1* 3

(A0111155) STRUCTURAL ANALYSIS – II

Prerequisites: Structural Analysis - I.

OBJECTIVES:

Analysis of beams and protal frame by kanis method, moment distribution, stiffness & flexible, cantilever methods. Analysis of two & three hinged arches

OUTCOMES:

At the end of the course student is able to

- ✤ Perform analysis of indeterminate structures.
- Perform analysis of indeterminate beams by iteration methods.
- Understand and perform analysis of portal frames by approximate methods

♦ Understand and perform analysis of continuous beams using matrix displacement and force

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	2	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	2	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	2	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	3	2	-
Avg.	3	3											3	2	

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 cycles.

UNIT – IV

KANI'S METHOD: Basic concepts- Analysis of continuous beams – including settlement of supports - portal frames (single bay-single storey) with and without side sway

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

- 1. Wang C.K. Intermediate Structural Analysis Tata Mc Graw Hill Publishers, 2010
- 2. Analysis of structures by Vazrani & Ratwani Khanna Publications
- 3. Analysis of Structures Vol. I & 2 by Bhavikathi, Vikas publications
- 4. Theory of structures by Ramamuratam

III B.Tech, I-Sem (CE)

T C 3+1* 3

(A0112155) TRANSPORTATION ENGINEERING -I

Prerequisites: None.

OBJECTIVES:

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

OUTCOMES:

At the end of the course student is able to

- Carry out surveys involved in planning and highway alignment
- Determine the characteristics of pavement materials
- Design cross section elements, sigh distance. horizontal and vertical alignment
- Design flexible and rigid pavements as per IRC
- Understand the principles of construction and Maintains of highway

✤ Implement traffic studies, traffic regulations and control, and Intersection Design

CO PO1	D1 PO2	D2 PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1 2	2			2								3		
CO2 3	;												3	
CO3 3	3	3 3											3	
CO4 3	3	3 3											3	
CO5 2	2									2			3	
CO6 3	2	2 3		2									3	
CO3 3 CO4 3 CO5 2 CO6 3	$\begin{array}{c c} 3\\ 3\\ 3\\ 2\\ 2\\ 2\\ 2\end{array}$	$\begin{array}{c c} 3 & 3 \\ 3 & 3 \\ \hline 2 & 3 \\ \end{array}$		2						2			3 3 3 3	

UNIT I

Introduction to Transportation Engineering: Transportation as system, modes of transportation systems

Highway Engineering: Introduction; Roads Development plans in India: Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

HIGHWAY MATERIALS: Soil, Aggregate and Normal Bitumen and Modified 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 – II

HIGHWAY GEOMETIC 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

UNIT – III

DESIGN OF HORIZONTAL AND VERTICAL ALIGNMENT: Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients-Vertical curves.

UNIT – IV

FLEXIABLE 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, IRC: 37-2001 method

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. Introduction to IRC: 58-2002 method of plain jointed rigid pavement Design

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., ., 9th edition (2011)

REFERENCE BOOKS/ MATERIAL

- 1. Transportation Engineering Introduction C. Jotin Khisty and B. Kent Lall, 3 rd Edition (2002). Prentice Hall India
- Principles of Transportation Engineering Chakraborty Partha and Animesh Das; 1st Edition; Prentice Hall India
- 3. IRC:37-2001 Guidelines for Design of Flexible Pavements; 2 nd Revision Indian Road Congress, New Delhi.
- 4. IRC:58-2002 Guidelines for Design of Plain Jointed Rigid Pavements; Indian Road Congress, New Delhi.
- 5. IS:73-2006; Paving Bitumen, Bureau of Indian Standards, New Delhi

III B.Tech, I-Sem (CE)

T C 3+1* 3

(A0113155) DESIGN OF REINFORCED CONCRETE STRUCTURAL ELEMENTS

Prerequisites: Concrete Technology and Mechanics of Materials. **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

OUTCOMES:

At the end of the course student is able to

- Understand the design philosophies of various methods of design.
- Design the Reinforced Concrete beams using limit state and working stress methods.
- Design Reinforced Concrete slabs.
- Design the Reinforced Concrete Columns and footings.
- Design structures for serviceability

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1		-	1	-	-	-	-	-	-	-	3	2	-
CO2	3	1	3	-	1	-	-	-	-	-	-	-	3	2	-
CO3	3	1	3	-	1	-	-	-	-	-	-	-	3	2	-
CO4	3	1	3	-	1	-	-	-	-	-	-	-	3	2	-
CO5	3	1	3	-	1	-	-	-	-	-	-	-	3	2	-
Avg.	3	1	3		1								3	2	

UNIT –I:

Introduction- Review of Concrete making materials - Grades- properties of Concrete- Modulus of elasticity-flexural strength-Characteristic and Design values-Partial safety factor.

Methods of design- Aims of design- RCC- Limit State method- Assumptions- Stress-Strain behaviour of Steel and Concrete- Stress block parameters- Working stress method.

UNIT –II

Beams: Analysis and Design of Singly Reinforced Beams, doubly reinforced beams, continuous beams and T beams.

UNIT –III

Columns: Design of RC Columns- Design principles of RC columns- Assumptions- Rectangular and Circular columns- Helical reinforcement- Minimum eccentricity-Use of Interaction diagrams for Axial load and Moment.

UNIT –IV

Footings: Design of Rectangular Footing, Square Footing and Combined Footing.

UNIT – V

Slabs: Design of RCC Slabs- Design of One Way, Two way slabs and Continuous Slabs- Effect of edge conditions- Moment of resistance-Torsion reinforcement at corners.

UNIT –VI

Serviceability: Design for Serviceability- Concept of Serviceability- Deflection- Span to depth ratio- Short term-Long term deflection due to Shrinkage, Creep- Cracking-Crack width calculation.

NOTE: All the designs to be taught in Limit State Method. IS 456 – 2000 and also any other relevant codes are permitted for examination.

- 1. Limit state designed of reinforced concrete P.C.Varghese, Printice Hall of India, New Delhi
- 2. Reinforced concrete design by S.Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.
- 3. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

III B.Tech, I-Sem (CE)

Т С 3+1* 3

PSO3

(A0114155) WATER RESOURCES ENGINEERING-I

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.

OUTCOMES:

At the end of the course student is able to

- ✤ Understand the water cycle occurs in nature
- Accountability of various abstractions like Rainfall, evaporation & transportation
- \Leftrightarrow Aquifer nature at different locations, flow computations from hydrographs
- \div Soil-water-plant relationship for efficient irrigation Canal distribution network design *

	· Can	iai uisu	ioution	networ	ik uesig	311								
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			-	-	-	-	-	-	-	-	-	1	2
CO2	2	2		-	-	-	-	-	-	-	-	-	1	2
CO3	2	2	3	-	-	-	-	-	-	-	-	-	1	2
CO4	2	2	3	-	-	-	-	-	-	-	-	-	1	2
CO5	2	1	3	-	-	-	-	-	-	-	-	-	1	2
Avg.	2	2	3		-								1	2

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**

HYDROGRAPH: Unit Hydrograph, definition, and limitations of applications of Unit hydrograph, derivation of Unit Hydrograph, S-hydrograph, Instantaneous Unit Hydrograph (IUH), Synthetic Unit Hydrograph. Design Discharge, Computation of design discharge-rational formula, Soil Conservation Service (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. Irrigation and water power engineering by Punmia & Lal, Laxmi publications pvt. Ltd., New Delhi
- 2. Engineering Hydrology by K.Subramanya, The Tata Mcgraw Hill Company, Delhi

REFERENCES:

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

III B.Tech, I-Sem (CE)

T C 3+1* 3

(A0115155) ENVIRONMENTAL ENGINEERING -I

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

OUTCOMES:

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

- Forecast the water demand according to population, Analyze characteristics of water, understand and analyze water quality testing and have Knowledge about different sources of water.
- Adopt and design suitable treatment technology to treat the raw water
- Analysis and Design the distribution network using hydraulics
- Identify the characteristics and quality of sewage and have knowledge about waste water collection systems
- Have knowledge about sanitary fittings ,sewer appurtenances and house plumbing network
- Suggest and design suitable treatment methods to treat waste water and sludge based on their quality and suitable methods for effluents disposal.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3				2	3							2	
CO2	3	2	3			3	3								2
CO3	3	3	3			3	3						1		
CO4	3	3				3	3								2
CO5	3					3	2						3		
CO6	3	1	3			3	3						1		

UNIT – I

INTRODUCTION :- Protected water supply – 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 – intakes – infiltration galleries.

UNIT-II

WATER TREATMENT : Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation-flocculation clarifier design – coagulants – feeding arrangements - 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, other disinfection practices-Miscellaneous treatment methods.

UNIT-III

WATER DISTRIBUTION NETWORK ANALYSIS : Distribution systems – Requirements, Layout of Water distribution systems - Design procedures- Hardy Cross and equivalent pipe methods service reservoirs – joints, valves such as sluice valves, air valves, scour valves and check valves water meters – laying and testing of pipe lines – pump house.

UNIT IV

WASTE WATER COLLECTION AND CHARACTERSTICS :Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – storm water overflows combined flow – characteristics of sewage – cycles of decay – decomposition of sewage, examination of sewage – B.O.D. – C.O.D. equations.

UNIT V

HOUSE PLUMBING : Design of sewers – shapes and materials – sewer appurtenances manholes – inverted siphon – catch basins – flushing tanks – ejectors, pumps and pump houses – house drainage – components requirements – sanitary fittings-traps – one pipe and two pipe systems of plumbing – ultimate disposal of sewage – sewage farming – dilution.

$\mathbf{UNIT} - \mathbf{VI}$

WASTE WATER TREATMENT : Layout and general out line of various units in a waste water treatment plant – primary treatment design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – biological treatment – trickling filters – standard and high rate – Construction and design of Oxidation ponds - Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks and Imhoff Tanks working principles and design – soak pits.

TEXT BOOKS:

- 1. Water supply and sanitary Engineering by G.S. Birdi, Dhanpat Rai & Sons Publishers.
- 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,

REFERENCS:

- 1. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr.
- 2. Water and Waste Water Technology by Steel
- 3. Water and Waste Water Engineering by Fair Geyer and Okun
- 4. Waste water treatment- concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India
- 5. Waste water Engineering by Metcalf and Eddy.
- 6. Unit operations in Environmental Engineering by R. Elangovan and M.K. Saseetharan, New age International
- 7. Environmental Engineering by georad.Kiely TMH Pubilications.

III B.Tech, I-Sem (CE)

T C 3+1* 3

(A0116155) GEOTECHNICAL ENGINEERING – I

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

OUTCOMES:

At the end of the course student is able to

- Characterize and classify soils
- Understand &Identify shear strength parameters for field conditions
- Compute and analyze the consolidation settlements
- Understand the principles of compaction and its control
- Determine the stress in soil due to different types of loadings
- Compute seepage through soil

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2			-	-	-	-	-	-	-	-	3	2	1
CO2	3	2	2		-	-	-	-	-	-	-	-	3	2	1
CO3	2	3	2	1	-	-	-	-	-	-	-	-	3	2	1
CO4	3	2	1		-	-	-	-	-	-	-	-	3	2	1
CO5	3	3			-	-	-	-	-	-	-	-	3	2	1
CO6	3	3			-	-	-	-	-	-	-	-	3	2	1

UNIT – I

INTRODUCTION: Soil formation – Major soil deposits of India-different types of soils-cohesive and cohesion less soils- Limitations of soil engineering-

Clay Mineralogy and Soil Structure - basic structural units -Adsorbed water- soil structure

Basic Definitions in soil mechanics- Three Phase diagram of soil-Volume relations ships, weight relations ships, Mass/Weight volume relationship – Relative density.

UNIT – II

INDEX PROPERTIES OF SOILS: 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 soil systems.

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

$\mathbf{UNIT} - \mathbf{IV}$

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. Time rate of consolidation and settlement calculations.

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. Modern Geotechnical Engineering by Alam Singh
- 3. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).

REFERENCES:

- 1. Soil Mechanics T.W. Lambe and Whitman, Mc-Graw Hill Publishing Company, Newyork.
- 2. Geotechnical Engineering by B.M.Das, Cengage Publications, New Delhi.
- 3. Geotechnical Engineering by Purushotham Raj.
- 4. Geotechnical Engineering by Manoj Dutta & Gulati S.K Tata Mc.Grawhill Publishers New Delhi.
- 5. Geotechnical Engineering V.N.S.Murthy, CRC Press, Newyork, Special Indian Edition
- 6. Soil Mechanics and Foundation by byB.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi.
- 7. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.

III B.Tech, I-Sem (CE)

T C 1+2* 1

(A0117155) CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT Skill Development Course

OBJECTIVES:

- The course objective of covers the hardened concrete properties & testing, mix design and special concretes.
- To learn basics of construction technology, excavation techniques & project planning using PERT & CPM.

OUTCOMES:

At the end of the course student is able to:

- Be able to apply theoretical and practical aspects of project management techniques to achieve project goals.
- Possess organizational and leadership capabilities for effective management of construction projects
- Be able to apply knowledge and skills of modern construction practices and techniques
- Have necessary knowledge and skills in accounting, financing, risk analysis and contracting.
- Be capable of using relevant software packages for planning, scheduling, executing and controlling of construction projects.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2									2	3		3		
CO2	2									2	3		3		
CO3	2									2	2		3		
CO4	2										2		3		
CO5	2				3								3		

UNIT-I

Importance of Project Management, Role of Project manager, Stakeholders in construction project, Different types of projects, similarities & dissimilarities in projects.,

UNIT-II

Time, Scope & Money, Knowledge areas & Processes involved in construction projects, WBS of a major work, with examples,

UNIT-III

Planning, monitoring & executing, Planning, sequencing, scheduling, Bar Charts,

UNIT-IV

Networks, CPM, PERT, Upgrading, Cash flow diagram, resource levelling & resource allocation, Crashing of project,

UNIT-V

Cost Optimization, Invoicing, Preparation of RA bill, Safety in construction, Estimation, Tenders & Contracts.

UNIT-VI

Equipment for construction, Construction Finances – decision making, Construction of piles, Construction of Tunnels, Construction of cofferdams.

- 1. Puerifoy R.L. Construction Planning Equipment & methods.
- 2. Punmia and Khandelwal K.K. Project Planning and Control Laxmi Publ. Delhi.
- 3. Srivatsava, 1998. Management in Construction Industry.
- 4. Antil & Woodh Critical Path Method in Construction Wiley International.
- 5. Mahesh Varma Construction Planning and Equipment Metropolitan Co.
- 6. Choudhary S. Project Management Tata McGraw Hill Publishing Company Limited

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech,I-Sem (CE)

C 2

Р

3

RGM-R-2015

(A0197155) CONCRETE TECHNOLOGY LAB

Prerequisites: Civil Engineering Materials and Concrete Technology.

OBJECTIVES:

Provides knowledge in testing on cement, fine & coarse aggregate

OUTCOMES:

At the end of the course student is able to:

- Implement good quality construction techniques
- ✤ Identify the quality of the fine aggregate
- ✤ Identify the quality of the coarse aggregate
- Identify the quality of the cement

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	2	1	-	-	1	1	3
CO2	2	3	-	-	-	-	-	-	2	1	-	-	1	1	3
CO3	1	3	-	-	-	-	-	-	2	1	-	-	2	1	3
CO4	1	2	-	-	-	-	-	-	2	1	-	-	2	1	3
Avg.	2	3							2	1			2	1	3

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

- 1. Fineness of cement
- 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
- 9. Mix Design (IS Code method)
 - a. Workability Tests: Slump Cone Test, Compaction factor test.
 - b. Preparing and curing concrete specimens for tests & Determination of compressive strength of concrete cubes

- 1. Properties of Concrete AM Nevelli 5 thEd, Prentice Hall Publishers, 2012.
- 2. Concrete Technology, M. S. Shetty S Chand Co., Publishers, 2006.
- 3. Concrete Technology, M. L. Gambhir Tata Mc Graw Hill Publishers, 2012

RGM-R-2015 RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY

III B.Tech, I-Sem (CE)

C 2

Р

3

(A0198155) GEOTECHNICAL ENGINEERING LAB

OBJECTIVES:

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

OUTCOMES:

At the end of the course student is able to

- Determine index properties of soils
- Classify soils
- Determine engineering properties of soils (lab & field)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	3	1	-	-	2	2	3
CO2	-	-	-	-	-	-	-	-	3	1	-	-	2	2	3
CO3	-	-	-	-	-	-	-	-	3	1	-	-	2	2	3
Avg.	-	-	-	-	-	-	-	-	3	1	-	-	2	2	3

LIST OF EXPERIMENTS

- 1. Grain size analysis
- 2. Atterberg's Limits
- 3. Compaction test
- 4. Field density-core cutter and sand replacement method
- 5. Permeability of soil, constant and variable head 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.

III B.Tech, I-Sem (CE)

P C 3 2

(A0199155) CIVIL ENGINEERING DRAWINGS USING AUTO CAD LAB

OBJECTIVES:

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

OUTCOMES:

At the end of the course student is able to

- Understand basic elements of civil engineering drawing
- Draw civil engineering drawings using AutoCAD software
- Develop 2D/3D drawing using AutoCAD software

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	3	-	-	-	3	1	-	-	3	2	1
CO2	-	3	-	-	3	-	-	-	3	1	-	-	3	2	1
CO3	-	3	-	-	3	-	-	-	3	1	-	-	3	2	1
Avg.	3	3	-		3	-	-	-	3	1	-	-	3	2	1

EXPERIMENTS

- 1. Builiding 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
- 6. Foundation Drawings: Two Exercises

REFERENCE:

- 1. Builiding 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

III B.Tech, II-Sem (CE)

T C 3+1* 3

(A0118156) GEOTECHNICAL ENGINEERING – II

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

OUTCOMES:

At the end of the course student is able to

- Determine the earth pressures on foundations and retaining structures
- Analyze shallow and deep foundations (including well foundations)
- ✤ Calculate the bearing capacity of soils and foundation settlements
- ✤ Able to design & execute the soil exploration scheme
- Able to perform the stability analysis of given slope

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	2	1	-	-	-	-	-	-	-	-	3	2	1
CO2	1	3	2	1	-	-	-	-	-	-	-	-	3	2	1
CO3	1	3	2	1	-	-	-	-	-	-	-	-	3	2	1
CO4	1	3	2	1	-	-	-	-	-	-	-	-	3	2	1
CO5	1	3	2	1	-	-	-	-	-	-	-	-	1	2	1
Avg.	1	3	2	1	-	-	-	-	-	-	-	-	3	2	1

UNIT – I

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

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 – 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 –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.

Note: Relevant IS: codes and tables are permitted for examination

TEXT BOOKS:

- 1. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi
- 2. Foundation Engineering by Varghese, P.C., Prentice Hall of India., New Delhi.
- Bowles, J.E., (1988) Foundation Analysis and Design 4th Edition, McGraw-Hill Publishing company, Newyork.

REFERENCES:

- 1. Das, B.M., (1999) Principles of Foundation Engineering -6th edition (Indian edition) Thomson Engineering
- Bowles, J.E., (1988) Foundation Analysis and Design 4th Edition, McGraw-Hill Publishing company, Newyork.
- Analysis and Design of Substructures Swami Saran, Oxford and IBH Publishing company Pvt Ltd (1998).
- 4. Geotechnical Engineering by S. K.Gulhati& Manoj Datta Tata Mc.Graw Hill Publishing company New Delhi. 2005.
- 5. Teng, W.C Foundation Design , Prentice Hall, New Jersy
- 6. Geotechnical Engineering by C.Venkataramaiah,
- 7. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi.
- 8. Soil Mechanics and Foundations by by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

III B.Tech, II-Sem (CE)

T C 3+1* 3

(A0119156) DESIGN OF STEEL STRUCTURAL ELEMENTS

Prerequisites: Mathematical Methods and Mechanics of Materials.

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.

OUTCOMES:

At the end of the course student is able to

- Design of bolt and welded connection
- Design of tension and compression member
- Design of gusseted base, column base and slab base.
- Design of plate girder
- Design of gantry girder

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	-	1	-	-	-	-	-	-	-	3	2	-
CO2	3	1	3	-	1	-	-	-	-	-	-	-	3	2	-
CO3	3	1	3	-	1	-	-	-	-	-	-	-	3	2	-
CO4	3	1	3	-	1	-	-	-	-	-	-	-	3	2	-
CO5	3	1	3	-	1	-	-	-	-	-	-	-	3	2	-
Avg.	3	1	3		1								3	2	

UNIT – I

Introduction: General- Types of Steel – Mechanical behavior of steel –Types of Structural Steel Sections. Design of Steel fasteners: Types of fasteners – Riveted connections- Bolted connections- Assumptions- Failure of bolted joints – Strength of bolted joints – Design examples – Design of Welded connections – Butt weld-fillet weld – Design examples

UNIT – II

Design of Tension Members: General – Modes of Failure of Tension member- Analysis of Tension members-Example - Design steps – Design examples – Lug angles.

UNIT – III

Design of Compression Members: General – Strength of Compression members- Design Compressive strength-Example on analysis of Compression members – Design of Angle struts – Design Examples- Built up Columns-Design of Lacing – Design of Battens- Design Examples.

UNIT – VI

Design of Column Base: Design of Column Base- Slab Base- Gusseted Base- Design Examples.

$\mathbf{UNIT} - \mathbf{V}$

Design of Gantry girders.

UNIT –IV

Design of Plate Girder: General- Components of Plate Girder- Optimum depth – Bending Strength – Shear Strength – Shear Buckling- Simple Post critical method- Tension Field method- Stiffeners-Bearing- Transverse stiffeners - Design Examples

Note: IS 800–2007 and Steel Tables are permitted for examination.

- 1. Design of steel structures by S.K. Duggal, Tata Mcgraw Hill, and New Delhi
- 2. Design of Steel structures by Subramanian,
- 3. Design of Steel Structures Arya & Azmani .
- 4. IS-800-2007. & Steel Tables

III B.Tech, II-Sem (CE)

T C 3+1* 3

(A0120156) WATER RESOURCES ENGINEERING-II

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.

OUTCOMES:

At the end of the course student is able to

- Get the knowledge of hydraulic structures and fixing the storage capacity of reservoirs
- Understand the design principles of Gravity and Earthen dams
- Get the knowledge of Spillways, Gates and design of Ogee Spillway
- Do seepage analysis though the soil under impervious floors of Hydraulic Structures
- Do analysis and design of Canal falls and Cross Drainage works

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3		-	-	2	-	-	-	-	-	-	1	2	-
CO2	3	3	3	-	-	2	-	-	-	-	-	-	1	2	-
CO3	3	2	3	-	-	2	-	-	-	-	-	-	1	2	-
CO4	3	3	3	-	-	2	-	-	-	-	-	-	1	2	-
CO5	3	3	3	-	-	2	-	-	-	-	-	-	1	2	-
Avg.	3	3	3	-	-	2	-	-	1	-	-	-	1	2	-

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.

REFERENCES:

- 1. Irrigation and Water Power Engineering Punmia and Lal, Laxmi Publications, New Delhi
- 2. Irrigation engineering K.R.Arora
- 3. Irrigation Engineering R.K. Sharma and T.K. Sharma, S. Chand Publishers
- 4. Irrigation and water resources engineering G.L. Asawa, New Age International Publishers
- 5. Concrete dams Varshney.
- 6. Theory and Design of Hydraulic structures Varshney, Gupta & Gupta
- 7. Water resources engineering Satyanarayana Murthy. Challa, New Age International Publishers Note: Khosla's Charts, necessary tables and graphs are permitted in the Examination hall.

III B.Tech, II-Sem (CE)

Т	С
3+1*	3

(A0121156) ENVIRONMENTAL ENGINEERING -II

OBJECTIVES:

Getting acquainted with physical, chemical and biological methods & possibilities of separation, recovery and deformation of various pollutants of gaseous and solid phase; basic processes and engineering equipment of the technology; characteristics of solid wastes, characterisation, collection and treatment, theoretical basics of burning solid wastes, typical equipment, solid waste disposal and recycling.

OUTCOMES:

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

- Understand human interaction with the Environment and have knowledge about sources of pollution and their effects on(human beings/Plants/ Materials)
- Gain knowledge of controlling methods for Environmental pollution(air/noise/hazardous waste)
- Have knowledge about solid waste and hazardous waste and their collection and disposal.
- Understand various Environmental protection control/acts
- ✤ Have knowledge about Theories industrial waste treatment

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1				3	3							2	
CO2	3	1				3	3							1	
CO3	3	2				3	3						3		
CO4	3	2				3	3						2		
CO5	2	3	2			3	3						2		

UNIT – I

INTRODUCTION: Air Pollution – sources of pollution – Classification – effects on human beings, Plants and Materials – Global effects of Air pollution – Air emissions standards.

UNIT – II

AIR POLLUTION CONTROL METHODS AND DEVICES: Air pollution Control Methods – Particulate control devices – General Methods of Controlling Gaseous Emission -Special Treatment Methods – Adsorption – Reverse Osmosis – Defluoridation – Ion exchange – Ultra Filtration.

UNIT –III

THEORIES INDUSTRIAL WATE TREATMENT: Theories industrial waste treatment – Volume reduction – strength reduction – Neutralization – Equalization – Proportioning – Nitrification and Denitrification – Removal of Phosphates – Effluent standards

UNIT – IV

SOLID WATE MANAGEMENT : Solid waste Management – sources, composition and properties of solid waste – collection and handling – separation and processing - Solid waste disposal methods – Land filling and Composting – Incineration.

UNIT – V

HAZARDOUS WASTE :Hazardous Waste – Nuclear waste – Biomedical wastes – chemical wastes – Effluent – disposal and Control methods.

UNIT – VI

NOISE POLLUTION :Noise Pollution – effects of noise and control methods – Environmental Audit – ISO – 14000, Water (prevention and control) Act, Air (prevention and control) Act.

TEXT BOOKS:

- 1. Environmental Science and Engineering by J.G.Henry and G.W.Heinke Person Education.
- Environmental Engineering and Management Dr.Suresh K.Dhameja S.K.Kartarai & Sons 2nd Edition 2005.
- 3. Environmental Engineering by Basak, Tata Mc.Graw Hill Edition, New Delhi.
- 4. Environmental Pollution Control Engineering by C.S Rao

REFERENCES:

- 1. Physico Chemical process for waster quality control by Weber
- 2. Solid Waste Engineering by Paarne Vesilind, Willaiam, Cengage Publications, New Delhi.
- 3. Air Pollution and Control by MN Rao & H.N.Rao.
- 4. Environmental Engineering by Gerard Kiely, Tata Mc.Graw Hill Edition, New Delhi.
- 5. Air Quality by Thod godish, Levis Publishers, Special India Edition, New Delhi.
- 6. Introduction to Environmental Engineering by Mackenzie.L.Davis, Devid.A.Cornwell, Tata Mc.Graw Hill Edition, New Delhi.

III B.Tech, II-Sem (CE)

T C 1+2* 1

(A0013156) PROFESSIONAL ETHICS AND SOFT SKILLS

(Common to all Branches) Skill Development Course

OBJECTIVES:

✤ The main objective of Engineering Ethics is to increase the awareness in engineering failures. Engineering decisions can impact public health, safety, business practices and politics .Engineering ethics is the field of applied ethics and system of moral principles that apply to the practice of engineering. The field examines and sets the obligations by engineers to society, to their clients, and to the profession. Engineering ethics in academic institutions has been undertaken by the directives of Supreme Court for creating awareness interactively among engineering students of all disciplines. By studying engineering ethics, the students develop awareness and assessment skill of the likely impact of their future decisions on moral and ethical grounds.

OUTCOMES:

At the end of the course student is able to

- ✤ Acquire professionalism based on ethical theorie
 - Learn Soft skills & Professional etiquettes
 - Improvement in communicative ability at the corporate level
 - ✤ Attain skill sets with global perspective

• Develop professional deliberations and be able to balance hard skills & soft skills

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	-	-	3	-	3	-	3	1	1	-
CO2	3	-	-	-	-	2	2	3	2	3	-	3	1	1	-
CO3	1	-	-	-	-	-	-	-	-	3	-	-	1	1	-
CO4	2	-	-	-	-	3	2	3	-	3	-	3	1	1	-
CO5	1	-	-	-	-	2	2	3	1	3	-	3	1	1	-
Avg.	2	-	-	-	-	2	2	3	1	3	-	3	1	1	-

Unit I

Nature and Scope of Engineering Ethics: Definition, Nature, Scope – Moral Dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory- Moral Reasoning and Ethical theories – Theories of Right Action-Self – Utilitarianism interest- Use of ethical Theories- case study.

Unit II

Professional Etiquettes : Professional Etiquettes – Mobile Etiquettes – Email Etiquettes - Kinesics – Proxemics - Chronemics – Chromatics – Olfacts - Haptics – Case study.

Unit III

Corporate Communication: Communication Models- Types of Communication – Downward and Upward Communication- Business Deliberations – Meetings – Negotiation Skills - Case Study.

Unit IV

Soft Skills: Interpersonal Communication – Johari Window – Interpersonal conflict resolutions- Daniel Goleman's Emotional Intelligence.

Unit V

Global Issues: Multinational Corporations – Corporate Governance - Corporate Social Responsibility Environmental Ethics – case study.

Unit VI

Introduction to Intellectual Property: Meaning and Types of Intellectual Property – Recent developments of the copy right act –Trademark Protection – Patent Law - Plagiarism.

Text books:

- 1. Professional Ethics by R.Subramanian, OXFORD
- 2. Business Communication, P.D. Chaturvedi, Mukesh Chaturvedi

References:

- The ACE of Soft Skills(Attitude, Communication and Etiquette for success) by Gopalaswamy Ramesh & Mahadevan Ramesh, Pearson 2010.
- Sessentials of Business Communication, Rajendra Pal, JS.Korlahhi, S.Chand
- Intellectual Property Right , Deborah E. BouchouxS, Cengage, 2005
- Business Ethics and Professional Values, A.B. Rao, Excel,2009
- M.P. Raghavan [2006], Professional Ethics and Human Values, Scitech Publications, Chennai.

III B.Tech, II-Sem (CE)

Р С 3 2

(A0181156) TRANSPORTATION ENGINEERING LAB

Prerequisites: Transportation Engineering.

OBJECTIVES:

* The objective of the course is to conduct tests on Concrete & Bituminous materials. Also able to use MX Roads software

OUTCOMES:

At the end of the course student is able to

- Perform quality control tests on pavements and pavement materials
- Conduct Quality control tests on concrete making materials
- Conduct traffic studies for estimating traffic flow characteristics

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3													3	3
CO2	3													3	3
CO3	3													3	3

I. BITUMINOUS MATERIALS:

- 1. Penetration Test.
- 2. Ductility Test.
- 3. Softening Point Test.
- 4. Flash and fire point Tests.
- 5. Marshall stability Test
- 6. Viscosity test using Brookfield Viscometer7. Binder extraction using centrifuge
- 8. Aging of Bitumen is Thin Film Oven Tester (TFOT)

II. TEST ON COARSE AGGREGATE

- 1. Determination of flakiness and elongation index
- 2. Determination of crushing value and abrasion value
- 3. Determination of Impact Value
- 4. Stripping value

III. TRAFFIC ENGINEERING TESTS

- 1. Drivers test equipment/unit
- 2. Alcohol breath analyser test
- 3. Digital Noise meter test
- 4. Air pollution meter(digital)
- 5. Automatic volume counters

IV. Design of flexible /Rigid pavements using MX Road Software (or) Geometric Design of Highways sing MX Road Soft ware (Demonstration)

Use of Project Management Software PRIMAVERA or Others

III B.Tech, II-Sem (CE)

P C 3 2

(A0182156) ENVIRONMENTALENGINEERING LAB

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.

OUTCOMES:

At the end of the course student is able to

- * Determine physical, chemical and biological characteristics of water and waste water
- Determine optimum dosage of coagulants
- ✤ Asses the quality of water and waste water.
- ✤ Capable to operate Environmental testing equipments

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	2	-	2	1	-	-	1	-	3
CO2	3	2	-	2	-	-	2	-	2	1	-	-	1	-	3
CO3	3	2	3	-	-	2	2	-	2	1	-	-	1	-	3
CO4	3	-	-	-	-	2	2	-	2	2	-	-	1	-	3
Avg.	3	2	3	2	-	2	2	-	2	1	-	-	1	-	3

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, settelable 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: "Standard Methods for the Examination of Water and Waste Water", APHA-AWWAWPCF, 25th Edn., Washington (D.C), 1995

III B.Tech, II-Sem (CE)

P C 3 2

(A0183156) CAD LAB

Prerequisites: None.

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.

OUTCOMES:

At the end of the course student is able to

- ✤ Have to create models.
- ✤ Understand the need for software tools in analysis i.e applying loads etc.
- Understand the need for software tools in design of structural elements

Use the latest software tools for Modeling, Analysis and Design of Civil Engineering Systems

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	3	-	3	-	-	-	-	1	-	-	2	1	1
CO2	1	3	3	-	3	-	-	-	-	1	-	-	2	1	1
CO3	1	3	3	-	3	-	-	-	-	1	-	-	2	1	1
CO4	1	3	3	-	3	-	-	-	-	1	-	-	2	1	1
Avg.	1	3	3		3					1			2	1	1

EXPERIMENTS

- 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. Software: Using STAAD Pro or STRUDS or STRAP etc.
IV B.Tech, I-Sem (CE)

T C 3+1* 3

(A0014157) MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS Common to CE, ECE and EEE

OBJECTIVES:

Provide knowledge management, CPM, PERT, Issues in organizations

OUTCOMES:

At the end of the course student is able to

- To have a practical insight of the concepts of managerial economics
- Apply the techniques of demand forecasting in the present economic scenario.
- Relate the concepts to the performance of different businesses, in the changing environment.
- Apply and interpret the different situations with the help of corporate finance techniques.

Analyze the financial position of the company.

							-	_							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	-	-	-	1-	-	-	-
CO2	-	-	3	3	2	2	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	1	3	3	-	-	2	2	-	-	-
CO4	3	-	-	3	2	-	-	-	-	-	2	-	-	-	-
CO5	-	-	-	-	-	2	-	1	-	-	2	2	-	-	-
Avg.	3	2	2	3	2	2	3	3	-	-	2	2	-	-	-

UNIT I:

INTRODUCTION TO MANAGERIAL ECONOMICS: Definition, nature and scope of managerial economics- relation with other disciplines- 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:

TYPES OF BUSINESS ORGANISATIONS AND 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 proposal, 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 financial statements through Liquidity Ratios (Current 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 Ratios and EPS), Du Pont Chart.

TEXT BOOKS:

- 1. Management Economics and Financial Analysis, Aryasri, 4/e, TMH, 2009.
- 2. Managerial Economics, Varshney & Maheswari, Sultan Chand, 2009.

REFERENCES

- 1. Financial Accounting and Analysis, Premchand Babu, Madan Mohan, Himalaya, 2009
- 2. Managerial Economics and Financial Analysis, S.A. Siddiqui, and A.S. Siddiqui, New Age
- 3. Principles of Business Economics, Joseph G. Nellis and David Parker, 2/e, Pearson.
- 4. Managerial Economics in a Global Economy, Domnick Salvatore, Cengage, 2009.
- 5. Managerial Economics, H.L.Ahuja, 3/e, S.Chand, 2009

IV B.Tech, I-Sem (CE)

T C 3+1* 3

(A0127157) TRANSPORTATION ENGINEERING-II

Pre-requisites: Transportation Engineering.

OBJECTIVES:

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

OUTCOMES:

At the end of the course student is able to

- ✤ Identify traffic stream characteristics
- ✤ Implement traffic studies, traffic regulations and control
- Identify Various types of sign boards and road markings on Indian National highways
 Understand elements of highway sofety and emmasches to essident studies

				* 1	0				0			0			
•	• Uno	derstan	d elem	ents of	highw	ay safe	ety and	approa	aches to	o accide	nt studie	es			
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3													3	
CO2	3								3					3	
CO3	3													3	
CO4	3													3	

UNIT-I

TRAFFIC CHARACTERISTICS: Basic characteristics of Traffic, Vehicles, roadusers 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-Origin &Destination(O&D) studies, Speed and Delay studies; Axle load studies; Capcity studies - Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams

UNIT-III

PARKING STUDIES: Types of parking facilities – On street 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- Channelization

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: Introduction to 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 - LR kadiyali (2009); Khanna publishers

REFERNCE BOOKS

- 1. Traffic Engineering, Roger P Roess and Elena S Prassas, 4 th Edition
- 2. Transport Planning and Traffic Engineering; CAO Flaherty, Taylor & Francis Publishers

IV B.Tech, I-Sem (CE)

T C 3+1* 3

(A0128157) ESTIMATION, COSTING AND VALUATION

Prerequisites: Building Planning and Construction, Building Drawing, Engineering Economics and Accountancy.

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

OUTCOMES:

At the end of the course student is able to

- Prepares quantity estimates for buildings, roads, rail and canal work
- ♦ Calculate the quantity of material required for civil engineering works as per specifications
- Prepare rate analysis for different construction materials
- Identify the wages or rates of labors
- Evaluate contracts and tenders in construction practices

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	2	3	-
CO2	2	3	-	-	-	-	-	-	-	-	2	-	2	3	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-	2	3	-
CO4	3	1	-	-	-	-	-	-	-	-	-	-	2	3	-
CO5	3	2	-	-	-	-	-	-	-	-	2	-	2	3	-
Avg	1	2	-	-	-	-	-	-	-	-	2	-	2	3	-

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.

$\mathbf{UNIT} - \mathbf{VI}$

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.

RGM-R-2015 RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY

Autonomous CIVIL ENGINEERING

IV B.Tech, I-Sem (CE)

T C 3+1* 3

(A0129157) ADVANCED STRUCTURAL DESIGN

Prerequisites: Design of reinforced concrete structural elements

OBJECTIVES:

The course objectives of this subject consist of Design of retaining wall, cantilever, Counterfort, RCC water, circular, rectangle tank, and chimney.

OUTCOMES:

At the end of the course student is able to

- Design different elements like retaining structures, water tanks, chimneys and silos independently
- Use Indian Standards for design
- Understand the codal provision for loading and design standards for bridges.
- Design deck slab and T beam bridges

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	-	1	-	-	-	-	1	2	-
CO2	3	3	3	-	-	1	-	-	-	-	-	2	1	2	-
CO3	3	3	3	-	-	-	-	2	-	-	-	-	1	3	-
CO4	3	3	3	-	-	2	-	-	-	-	-		1	3	-
Avg.	3	3	3	-	-	2	-	2	-	-	-	2	1	3	-

UNIT – I

Retaining walls: Design Example of Cantilever retaining wall and Counter fort retaining wall.

UNIT – II

Water Tanks: Types of water tanks- Design Example of Rectangular water tank, Circular water tank & Intzetype overhead tank.

UNIT – III

Flat-Slab floor system: Design Example of interior panel and exterior panel of Flat slab.

UNIT - IV

Gird floor system: Analysis of grid floors-Design Examples.

UNIT – V

Bunkers and Silos: Design Examples of Bunkers and silos.

$\mathbf{UNIT} - \mathbf{VI}$

Chimneys: Design of Chimney.

Note: Relevant IS: codes and tables are permitted for examination

Reading:

- 1. Design drawing of concrete and steel structures by N.Krishna Raju University Press 2005.
- 2. Punmia B.C. Ashok Kumar Jain and Arun K. Jain, RCC Designs(Reinforced Concrete Design), 10th Edition, Lakshmi Publishers, 2006, IS 3370.

IV B.Tech, I-Sem (CE)

P C 3 2

(A0138157) GROUP DISCUSSION AND MOCK INTERVIEW (GDMI)

(Skill Development Course)

OBJECTIVES:

✤ A group discussion aims at a structured but informal exchange of knowledge, ideas, and perceptions among the participants on any issue, topic or sub-topic. Contributions are pooled together and examined in terms of their relevance and validity to the discussion objectives. If planned and organized in a structured way and certain essential conditions are met, it can provide a highly enriching and stimulating experience to the participants.

OUTCOMES:

At the end of the course student is able to

- The students can develop good leadership skills, communication skills, Good interpersonal skill, analytical and lateral thinking.
- To apply the principles of a good presentation and develop the art of presenting effectively
- To become a good team player by learning about the advantages of team building
- The student would be able to perform well in interviews and extempore sessions
- The student also learns the importance of developing self motivation by being influenced by successful stories.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1								2	2	3		3				
CO2										3		3				
CO3								2	3	3	2					
CO4						2				3						
CO5								2	2	3		3				

UNIT-I

Group Discussion: Introduction-Types of GD-D topics-Do's and Don't's in GD -GD Tips-Difference between GD and Debate-Mock GD's and Debate - Role Play in a Group Discussion

UNIT-II

Presentation Skills: Presentation Evaluation-Just a minute speeches-Creating a power point presentation-Body language-Conclusions-Planning a meeting-Analyzing a meeting-Analyzing agendas-Round table discussions-Small group presentation-Shaking hands-Logging silences-Talent search-To speak or not to speak-relation ships.

UNIT-III

Team Work Skills:Dimensions of team building-Components of team building-Purpose of teams-Building blocks for team-Types of team-Team leader skills.

UNIT-IV

Interview Skills: Introduction – concept – Types of Interviews – Characteristics of Interviewe – Recruitment interview – Appraisal interview – Research interview.

UNIT – V

Extempore: Introduction To Extempore - Common Extempore Topics – SWOT Analysis

UNIT – VI

Motivational Themes: How to win Friends and influence people by Dale Carnegie, The Go-Giver: A little story about a powerful Business idea by Bob Burg and John David Mann, How to talk to anyone – 92 little tricks for big success in relationship by Leil Lowndes.

REFERENCE BOOKS:

- 1. How to win Friends and influence people by Dale Carnegie.
- 2. The Go-Giver: A little story about a powerful Business idea by Bob Burg and John David Mann
- 3. How to talk to anyone 92 little tricks for big success in relationship by Leil Lowndes.

IV B.Tech, I-Sem (CE)

P C 3 2

(A0184157) GEOGRAPHICAL INFORMATION SYSTEMS PRACTICE

OBJECTIVES:

• In this laboratory students will learn the GIS software capabilities and applications.

OUTCOMES:

At the end of the course student is able to

- ◆ Use of digital photo-grammetry in remote sensing
- Knowledge of basic physics of remote sensing, electromagnetic radiation interaction, types of satellite orbits, the digital images, their formats, types of sensors and various fundamental image processing routines
- Solution Basic knowledge of GIS terminology, components and frame work.
- Data analysis by using various GIS techniques.

Application of Remote Sensing and GIS to solve various real world problems.

						<u> </u>									
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	1	1	1	1	-	-	-	-	1	1	-
CO2	3	2	-	-	2	2	-	1	-	-	-	-	1	1	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-	1	1	-
CO4		3	1	-	1	1	-	-	-	-	-	-	1	1	-
CO5	-	-	2	3	2	2	-	2	-	-	-	2	1	1	-
Avg.	3	3	1	3	2	2	-	2	-	-	-	2	1	1	-

SOFTWARE :

- 1. ArcMap, ERDAS IMAGINE, GeoMedia, IDRISI
- 2. Open source software like GRASS GIS, ILWIS, JUMP GIS, MapWindow GIS, QGIS, SAGA GIS

EXCERCISES:

- 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.

IV B.Tech, I-Sem (CE)

P C 3 2

(A0185157) CASE STUDIES IN CIVIL ENGINEERING

OBJECTIVES

- To apply the knowledge that learned during the course work
- To expose the student to different domains of Civil Engineering applications

OUTCOMES

At the end of the course student is able to

- Understand about the components related to Civil Engineering structures.
- Analyse the different structures of Civil Engineering.
- Design the Structures of Civil Engineering.
- ✤ Able to use different software packages.
- Get knowledge regarding recent advancements.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	-	-	-	-	3	-	1	-	2	3	2
CO2	1	3	2	-	1	-	-	-	3	-	1	-	3	2	3
CO3	-	2	3	-	1	-	-	-	3	-	2	-	3	3	3
CO4	-	-	-	-	3	-		-	3	-	3	-	3	3	3
CO5	-	-	-	3	-	-	-	-	3	-	3	-	3	3	3
Avg.	3	2	2	3	2	-	-	-	3	-	2	-	3	3	3

- 1. Case study related Bridge Structure. (Any Box culvert/Pipe culvert, Deck slab bridge)
- 2. Case study related to Water Resources Engineering. (Any hydraulic structure like spillway, tank, canal fall, CD works Reservoir operation etc.)

http://cwc.gov.in/main/downloads/Real%20Integrated%20Operation%20of%20Reservoirs%20.pdf

- 3. Case Study of Green Buildings (<u>https://igbc.in/igbc/</u>, http://greenbuildinglocator.in.saint-gobain-glass.com/)
- Case studies in Geotechnical/Structural engineering http://www.iitgn.ac.in/gise2014/handouts/IGS%20GN%20Keller%20Short%20Term%20Course%20V er%201.pdf
- 5. Case Studies in Transportation Engineering(http://www.unep.org/transport/lowcarbon/Pdf's/publications/dfc_fullreport.pdf)
- Case Studies of high rise buildings http://www.ijetch.org/papers/671-EA1012.pdf
- 7. Case study on Environmental Engineering http://www.who.int/water_sanitation_health/resourcesquality/wpccasestudy1.pdf
- 8. Case study on software (Like Design Studio, Blender, EPANET, SWMM, GEOMEDIA, MATLAB etc.)

Note: Student has to select any one of the above mentioned topic and collect information present in the form of a record.

IV B.Tech, II-Sem (CE)

T C 3+3* 3

(A0139158) DESIGN AND DRAWING OF IRRIGATION STRUCTURES

OBJECTIVES:

Irrigation structures plays 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 coarse student can get the complete knowledge of well known canal falls, the straight glacis weir and trapezoidal notch fall.

OUTCOMES:

At the end of the course student is able to

- * Knowledge about various components of Hydraulic structures
- Flood estimation from the catchments and design of the water way of Hydraulic structure
- ♦ Design of various components like foundations, piers, walls and abutments
- Physically making the drawing charts of various irrigation structures

* Knowledge of constructional specifications and protection measures like friction blocks etc.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3			-	-	-	-	-		-	-	-	1	1	-
CO2	3	2	3	-	-	-	-	-	3	-	-	-	1	1	-
CO3		2	3	-	-	-	-	-		-	-	-	1	1	-
CO4	3	2		-	-	-	-	-		-	-	-	1	1	-
CO5	3	2	2	-	-	-	-	-		-	-	-	1	1	-
Avg.	3	2	3	-	-	-	-	-	3	-	-	-	1	1	-

Design and drawing of the following irrigation structures.

- 1. Canal regulator.
- 2. Trapezoidal notch fall.
- 3. Surplus weir.
- 4. Tank sluice with tower head
- 5. Straight glacis weir.
- 6. Type III Syphon aqueduct.

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 C.Satyanarayana Murthy, Wiley eastern Ltd.
- 2. Irrigation engineering and Hydraulic structures S.K.Garg, Standard Book House.

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY

Autonomous CIVIL ENGINEERING

IV B.Tech, II-Sem (CE)

T C 1+2* 3

RGM-R-2015

(A0148158) GREEN BUILDINGS

(Skill Development Course)

OBJECTIVES:

- Understand the concept of high performance green buildings and sustainability.
- Secome familiar with the vocabulary associated with green buildings..
- Understand the physical limitations of the materials we are studying.
- Secome familiar with USGBC's LEED-NC suite of standards.
- Know about the charrette process and the design process for high-performance buildings.
- Understand the concepts of sustainable landscapes and high-performance building energy design.
- Learn about the selection of mechanical and electrical lighting systems..
- Learn about green building water supply and waste water supply strategies.
- Become familiar with the issues in selecting green building materials.
- Become familiar with indoor environmental quality factors.
- Learn how to reduce the ecological footprint of construction operations.
- Become familiar with green building commissioning.

OUTCOMES:

At the end of the course student is able to

- Students could learn about the various components involved in planning, design, construction and operation of railways and waterways.
- * In case of railways the need of tunnels and the related surveys, operation and construction is covered.
- Pros and cons of railways and waterways in terms of construction, operations, maintenance and economics are learnt.
- Urban rail transportation as mass transportation facility is studied apart from the vital role played by harbour structure for the import and export of goods.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1									-	2	2
CO2	3	2	2	1									-	2	-
CO3	1	2	2	2									-	2	-
CO4	-	2	1	2									-	2	1

Unit-I:

Introduction of green building, Concept of green building, History of green building, Need of green building in present scenario, Importance of green building, Merits and demerits.

Unit-II:

Classification of green building, Assessment methods, Global assessment and certification, BREEAM(Building Research Establishment's Environmental Assessment Method), GB Tool, LEED (Leadership in Energy and Environmental Design), CASBEE (Comprehensive Assessment System for Building Environmental Efficiency), Green Globes, Local assessment, LEED India, GRIHA (Green Rating for Integrated Habitat Assessment).

Unit-III:

Development of energy efficient building, Introduction, Concept, Advantages, Design parameters, Sustainable Sites, Water Efficiency,

Unit-IV :

Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, An additional category Innovation & Design criteria.

Unit-V:

Energy Conservation Building Code, Study of existing green buildings.

Unit-VI:

Principles and Planning concepts of green buildings: Salient features of a Green Building, Site Integration, Benefits of green Buildings Planning concepts of Green Buildings or Ecohousing, Environmentally Friendly, Non-Toxic Paint ,Green Roofing ,Use of Insulating Materials ,Cost Effective Housing.

Text Books :

- 1. H, Ravindranath, K UshaRao, B Nataraja n, P Monga, Renewable Energy and Environment A Policy Analysis for India, Tata McGraw Hill, 2000.
- 2. M Fowler, Energy and the Environment, 2nd Ed, McGraw Hill, New York, 1984

RGM-R-2015 RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY

Autonomous CIVIL ENGINEERING

III B.Tech, II-Sem (CE)

T C 3+1* 3

(A0019156) INDUSTRIAL MANAGEMENT

(Elective-I)

(Common to CE and ECE)

OBJECTIVES

- To examine the latest business thinking and supplies expert knowledge on engineering and technology issues and theories and to provide the business expertise essential for senior managers by combining specific engineering subjects with managing technology and manufacturing systems.
- To address and solve real life problems relating to industrial set-ups.
- To provide a conceptual framework for handling the diverse and complex human relations problems in business and industries.
- * To understand various quality assurance programs that are currently being implemented by businesses

OUTCOMES

- Relate the importance of management to the work place
- Practically assess the concept of plant layouts in production
- Using the techniques of work study and time study in measurement of work
- Analyzing the inventory stock by using the inventory control techniques and also applying the marketing strategies of the product in different stages of product life-cycle.
- Learn to judge the quality of a product by application of different techniques of quality control
- ✤ Implement the various aspects of human resource management

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1									3	2	2					
CO2	2		2		3											
CO3			2	1	2						3					
CO4					2		1			2						
CO5			2	3	2											
CO6								3		3	2	2				

UNIT I

Professional Management: Concepts of Management – Functions of Management – Systems Approach to Management Evolution of Management Thought : Taylor's Scientific Management, Fayol's Principles of Management, Douglas Mc-Gregor's Theory X and Theory Y, Mayo's Hawthorne Experiments, Hertzberg's Two Factor Theory of Motivation, Maslow's Hierarchy of Human Needs –Leadership styles and characteristics of effective leadership.

UNIT-II

Plant Location And Plant layout: Plant Location, definition, factors affecting the plant location –plant layout, types of plant layout-Productivity and Production: Definition of productivity, production, techniques for enhancing productivity level.

UNIT III

Work study - Definition, Method study - definition, method study an outline, various types of charts Work measurement- definition, time study, , Work Sampling – definition , standard time calculations

UNIT-IV

Materials Management-Objectives, Inventory – functions types associated costs, inventory control techniques (ABC And EOQ). Stores Management and Stores Records. Purchase management, duties of purchase manager, associated forms.

Marketing Management: Definition-4Ps of Marketing Mix -Market segmentation- Targeting and positioningproduct life cycle and marketing strategies in different stages of product life cycle-

UNIT V

QUALITY CONTROL: Meaning, process control, Statistical Quality Control-techniques-variables Attributesassignable and non assignable causes- variable control charts, and R charts, attributes control charts, p charts

Autonomous

CIVIL ENGINEERING

and c charts. Acceptance sampling plan- single sampling and double sampling plans,OC curves. Introduction to TQM- Quality Circles, ISO 9000 series procedures.

UNIT VI

HUMAN RESOURCE MANAGEMENT: Functions of HRM, Job Evaluation, methods of job evaluationmerit rating, different methods of merit rating.

TEXT BOOKS:

- 1. Manufacturing Organization and Management, Amrine/ Pearson, 2nd Edition, 2004.
- 2. Industrial Engineering and Management O.P. Khanna Dhanpat Rai.

REFERENCES:

- 1. Stoner, Freeman, Gilbert, Management, 6th Ed, Pearson Education, New Delhi, 2005.
- 2. Panner Selvam, Production and Operations Management, PHI,2004.
- 3. Dr. C. Nadha Muni Reddy and Dr. K. Vijaya Kumar Reddy, Reliability Engineering & Quality Engineering, Galgotia Publications, Pvt., Limited.
- 4. Ralph M Barnes, Motion and Time Studies, John Wiley and Sons, 2004.
- 5. Chase, Jacobs, Aquilano, Operations Management, TMH 10th Edition, 2003

III B.Tech, II-Sem (CE)

T C 3+1* 3

(A0150156) FINITE ELEMENT METHODS IN CIVIL ENGINEERING

(Elective-I)

Pre-requisites: Mathematical Methods.

OBJECTIVES:

This is an introductory course to understand and applies 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 element.

OUTCOMES:

At the end of the course student is able to

- Understand the fundamental ideas of FEM.
- Develop shape functions and stiffness matrices for different elements
- Generate global stiffness matrices and global load vectors
- Have knowledge on generation of shape function for higher order elements using lagrangian interpolation function.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	3	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	3	3	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-	3	3	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	3	3	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	3	3	-
Avg.	3	3											3	3	

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 Axi-symmetric bodies of revolution with axi-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, isoperimetric 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 axi-symmetric element

READING:

- 1. Finite Elements Methods in Engineering by Tirupati.R. Chandrepatla and Ashok D. Belegundu Pearson Education Publications.
- 2. Finite Element analysis Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers.

III B.Tech, II-Sem (CE)

T C 3+1* 3

(A0122156) WATER RESOURCES SYSTEM PLANNING AND MANAGEMENT (Elective-I)

OBJECTIVES:

Water resource systems deals with modeling 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.

OUTCOMES:

At the end of the course student is able to

- Understand the Concept of systems approach to water resources planning and management
- * Know the application of Linear programming in water resources
- Know the application of dynamic programming for resource allocation
- Know the application of simulation techniques in water resources
- ↔ Plan and operation of reservoir system, conjunctive use of surface and sub-surface water resources

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3			-	-	-	-	-	-	-	-	-	1	2	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-	1	2	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	1	2	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	1	2	-
CO5	2	1	2	-	-	-	-	-	-	-	-	-	1	2	

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.

$\mathbf{UNIT} - \mathbf{IV}$

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:

- 1. Water Resources System Analysis-S Vedula & PP Mujumdar, Tata Mc Graw Hill Company Ltd. 2005.
- 2. Water Resources Economics James & Lee. Oxford Publishers 2005.

REFERENCES:

- 1. Optimisation technique by S.S.Rao
- 2. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003.
- 3. Operations research by P.Sankar Iyer, TMH Pubilications, New Delhi.
- 4. Operations research by N.Ramanathan, TMH Pubilications, New Delhi

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY

Autonomous CIVIL ENGINEERING

III B.Tech, II-Sem (CE)

T C 3+1* 3

RGM-R-2015

(A0123156) PRESTRESSED CONCRETE

(Elective-I)

Pre-requisites: Design of concrete structures.

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 & post-tensioned members, Different systems of pre-stressing, losses of pre-stressing members, analysis of section for flexure, design of section for flexure & shear & deflection.

OUTCOMES:

At the end of the course student is able to

- Evaluate the losses that occur in pre-tensioning and post-tensioning members
- Difference between different types of pre-stressing systems
- Determine different types of extreme fiber stresses by analyzing the pre-stressed concrete girders
- Understand the process of transfer of pre-stressing force to the members
- Design the pre-stressed concrete members for flexure and shear

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2		-	-	-	-	-	-		-	3	-
CO2		1	1	1		-	-	-	-	-	-		-	3	-
CO3	3	3	3	3	2	-	-	-	-	-	-	2	-	3	-
CO4		1	1	2		-	-	-	-	-	-		-	3	-
CO5	3	3	3	3	3	-	-	-	-	-	-		-	3	-
Avg.	3	2	2	2	2	-	-	-	-	-	-	2	-	3	-

UNIT – I

Introduction: Fundamentals of prestressing - Classification and types of prestressing- Concrete Strength and strain characteristics - Steel mechanical properties - Auxiliary Materials like duct formers.

UNIT – II

Prestressing Systems: Principles of pretensioning and post tensioning - study of common systems of prestressing for wires strands and bars.

UNIT – III

Losses of Prestress: Losses of prestress in pre tensioned and post tensioned members - I.S. code provisions.

$\mathbf{UNIT} - \mathbf{IV}$

Analysis of Sections: In flexure, simple sections in flexure, kern distance - cable profile - limiting zones - composite sections cracking moment of rectangular sections.

$\mathbf{UNIT} - \mathbf{V}$

Design of Simply Supported Beams: Allowable stress as per I.S. 1343 - elastic design of rectangular and I-sections

UNIT – VI.

Shear and Bond: Shear and bond is prestressed concrete beams - conventional design of shear reinforcement - Ultimate shear strength of a section - Prestress transfer in pretensioned beams-Principles of end block design

Codes: BIS code on prestressed concrete, IS 1343.

Reading:

- 1. Krishna Raju. N "Prestressed Concrete", Tata Mc Graw Hill.
- 2. Lin.T.Y, "Prestressed concrete", Mc Graw Hill Pub. Co.
- 3. Rajagopalan, "Prestressed concrete", Narosa Publishing House.

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY

Autonomous CIVIL ENGINEERING

III B.Tech, II-Sem (CE)

T C 3+1* 3

RGM-R-2015

(A0124156) BRIDGE ENGINEERING

(Elective-II)

Pre-requisites: Design of steel structures and Design of concrete structures.

OBJECTIVES:

- To develop an understanding of and appreciation for basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location and functionality.
- To help the student develop an intuitive feeling about the sizing of bridge elements, ie. develop a clear understanding of conceptual design.
- ✤ To understand the load flow mechanism and identify loads on bridges.
- To carry out a design of bridge (like box culvert, T-beam bridge etc.,) starting from conceptual design, selecting suitable bridge, geometry to sizing of its elements

OUTCOMES:

- ✤ At the end of the course student is able to
- Have knowledge of types of bridges, components of bridges and basic definitions
- Understand sub-surface investigations required for bridge construction
- Understand standard specification for bride design
- Design RCC deck slab and T-Beam bridge girders
- Design of sub-structure, bearings and joints

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2											3	3	
CO2	3	2											3	3	
CO3	3	2											3	3	
CO4		3	3										1	1	
CO5		3	3										1	1	
Avg.															

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.

Note: Necessary tables and codes are permitted in the Examination hall

READING:

- 1. Design of Bridges by N. Krishna Raju (Oxford & IBH Publishing Co. Pvt Ltd)
- 2. Essentials of bridge engineering: D.Jhonson Victor
- 3. Bridge Engineering: Ponnuswamy)

III B.Tech, II-Sem (CE)

T C 3+1* 3

(A0012156) PROBABILITY AND STATISTICS (Elective-II)

(Common to CE, CSE, IT and ME)

OBJECTIVES:

To help the students in getting a thorough understanding of the fundamentals of probability and usage of statistical techniques like testing of hypothesis, statistical quality control and queuing theory.

OUTCOMES:

At the end of the course student is able to

- Knowledge of Probability, random variables and Distributions, Sampling Distributions, Test of Hypothesis, Queuing process to solve various problems of engineering and science.
- Understand solutions of discrete and continuous distributions including moment generating functions, Functions of random variables and sampling distributions
- Analyze methods of sample spaces, counting techniques, laws of probability, conditional probability
- * Apply various techniques of Probability and Statistics to solve all kinds engineering problems
- Synthesize problems of testing statistical hypotheses for a simple population using the knowledge of One-sample and two-sample estimation and hypothesis testing

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO5	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Avg.	3	3	2	-	3	-	-	-	-	-	-	-	-	-	-

UNIT - I

Basic concept of probability-Random variables-Expectation-Discrete and continuous distributions.

UNIT – II

Distribution functions. Binomial, poison and normal Distributions-Related properties.

UNIT – III

Test of Hypothesis: population and sample – Confidence interval of mean from normal distribution – Statistical Hypothesis – Null and Alternative hypothesis- level of significance. Test of significance – Test based on normal distribution –Z test for means and proportions.

UNIT-IV

Small samples – t- test for one sample and two sample problem and paired t- test, F- test and chi-square test (Testing of goodness of fit and independence).

UNIT – V

Statistical quality control: Concept of quality of a manufactured product –Defects and Defectives – causes of variations – Random and assignable – The principle of Shewhart control chart-Charts for attribute and variable quality characteristics-Constructions and operation of \bar{X} -Chart, R-Chart, P-chart and C-chart.

UNIT – VI

Queuing theory: Pure birth and Death process, M/M/1 and M/M/S and their related simple problems.

TEXT BOOKS :

- 1. Probability and statistics for Engineers by Miller and Freunds, Pearson education.
- 2. Probability and statistics for Engineers by Dr.J.Ravichandran, wiley-India publishers.

References :

- 1. Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.
- 2. Statistical methods by S.P.Gupta, S.Chand Publications.
- 3. Probability and statistics for science and engineering by G.Shankerrao, universities press.
- 4. Engineering Mathematics BySrimantha Pal et.al. Oxford University Press.

III B.Tech, II-Sem (CE)

T C 3+1* 3

(A0125156) OPEN CHANNEL HYDRAULICS (Elective-II)

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.

OUTCOMES:

At the end of the course student is able to

- Understand the open channel characteristics including hydraulic jump and transitions
- Get the knowledge about gradually and rapidly varied open channel flows.
- Analyse the flow characteristics in open channels
- Analyse the flow profiles using GVF Computation methods.
- Solve the hydraulic jump problems.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1											1	2	1
CO2	3	1											1	2	1
CO3	1	3	2										1	2	1
CO4	1	3	2										1	2	2
CO5	1	3	1										1	2	2

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 trasitional 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, Stiling 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, Standared House, New Delhi
- 4 Henderson: Open Channel Hydraulics, Mr. Millan Publishing Co. Ltd, New Delhi

III B.Tech, II-Sem (CE)

T C 3+1* 3

(A0126156) ADVANCED LAND MEASUREMENT TECHNIQUES (Elective-II)

OBJECTIVES:

This course exposes students to some of the advanced methods of land measurement. The course will prepare students to design and execute larger projects where mapping is an essential component using much advanced technologies. Further, it will help them see the research frontiers in land measurement.

OUTCOMES:

At the end of the course student is able to

- Understand GPS range and time measurements, errors, surveying methodologies and filed procedures.
- * Knowing the idea on Laser properties and methods of range measurements
- Understand the components of LiDAR systems and INS-GPS integration
- Understand the fundamental concepts of photogrammetry

*	Understand the interior and	exterior orientation	,mathematical mode	l relating image and	d object space
•	Chaefstand the interior and	exterior orientation	,mainematical moue	i relating innage and	a object spe

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2			3								3	2	1
CO2	3	2			3								3	2	1
CO3	3	2			3								3	2	1
CO4	3	2			3								3	2	1
CO5	3	2			2								3	2	1
Avg.	3	2			3								3	2	1

UNIT- I

GPS basic concepts: pseudo range and carrier phase measurements; GPS coordinate systems- WGS-84, GPS time

GPS Errors: Errors and biases in GPS- timing, orbital, ionospheric and tropospheric effects; Ambiguity resolution; Cycle slips, Multipath and other observational errors

UNIT – II

GPS Surveying procedures: Surveying with GPS- point positioning, relative positioning, static and kinematic positioning, Planning and field observations- networking

Laser physics: spectral characteristics of laser, laser interaction with objects

UNIT – III

Measurement of laser range-CW and pulse method, laser pulse, energy, pulse width and related definitions; LiDAR equation and related physics

$\mathbf{UNIT} - \mathbf{IV}$

Principle of laser scanning: Basic concept of scanning and computation; Sensor specifications, point repetition frequency, scanning frequency, maximum and minimum range, INS, GPS, and INS-GPS integration; different types of scanning sensors Topographic and bathymetric laser scanning; Footprint, Multiple return, full wave digitization for data capture;

UNIT – V

Laser applications: DEM generation algorithms and introduction to other applications

Photogrammetry: Metric and non-metric cameras; Geometry of near vertical and tilted photographs, heights and tilt distortions; Rectification and orthophotographs

$\mathbf{UNIT} - \mathbf{VI}$

Stereoscopy, parallax equation and stereo measurements for height determination

Orientation- interior, exterior, relative, and absolute; Mathematical model relating image, model and object space; Collinearity and coplanarity conditions, Bundle block triangulation

TEXT BOOKS & REFERENCE:

- 1. GPS Satellite Surveying, Alfred Leick, John Wiley
- 2. GPS for Land Surveyors, Sickle, J. V. Ann Arbor Press
- 3. David F. Maune(2002): Digital elevation model technologies and applications: The DEM users manual:; Manual of Remote Sensing: ASPRS; 2002
- 4. George Vosselman and Hans-Gerd Maas(2010), Airborne and Terrestrial laser scanning, CRC Press, New York
- 5. Jie Shan and Charles K Toth (2009) Topographic laser ranging and scanning: principle and processing, CRC Press, New York
- 6. Moffit, Francis H. and Mikhail, Edward M. Photogrammetry. Third Ed., New York: Harper& Row, 1980.
- 7. Wolf, Paul, R. Elements of Photogrammetry. Second Ed., McGraw-Hill, 1982.

IV B.Tech, I-Sem (CE)

T C 3+1* 3

(A0130157) GEOINFORMATICS

(Elective-III)

Open Elective

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.

OUTCOMES:

At the end of the course student is able to

- ✤ Use of digital photogrammetry in remote sensing
- Knowledge of basic physics of remote sensing, electromagnetic radiation interaction, types of satellite orbits, the digital images, their formats, types of sensors and various fundamental image processing routines
- Solution Basic knowledge of GIS terminology, components and frame work.
- Data analysis by using various GIS techniques.
- Application of Remote Sensing and GIS to solve various real world problems.

						0									
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2			1	1	1	-	-	-		-	1	1	-
CO2	3	2			2		1	-	-	-		-	1	1	-
CO3	3	2	1					-	-	-		-	1	1	-
CO4		3	1		1			-	-	-		-	1	1	-
CO5			2	3	2		2	-	-	-	2	-	1	1	-
Avg.	3	2	1	3	2	1	1	-	-	-	2	-	1	1	-

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.

$\mathbf{UNIT} - \mathbf{V}$

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.

TEXT BOOKS:

- 1. Remote Sensing and GIS B.Bhatta, Oxford University Press, New Delhi.
- 2. Remote Sensing and its applications by LRA Narayana University Press 1999.

REFERENCES:

- 3. Advanced surveying : Total station GIS and remote sensing Satheesh Gopi Pearson publication.
- 4. Geographical Information Science Narayana Panigrahi, University press, New Delhi
- 5. GIS by Kang tsung chang, TMH Publications & Co.,
- 6. Principals of Geo physical Information Systems Peter A Burragh and Rachael Mc Donnell, Oxford Publishers 2004
- 7. Concepts & Techniques of GIS C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
- 8. Basics of Remote sensing & GIS S.Kumar, Laxmi Publications.
- 9. The GIS book Korte, cengage publications, New Delhi.
- 10. Fundamental of GIS Mechanical designs John Wiley & Sons.
- 11. Remote sensing and GIS M.Anji Reddy, B.S.Pubiliications, New Delhi.
- 12. Geoinformation for Development by Zeil/Kienberger (Eds) Univ. Science Press, New Delhi

IV B.Tech, I-Sem (CE)

T C 3+1* 3

RGM-R-2015

(A0131157) RAILWAYS, DOCKS & HARBOR ENGINEERING

(Elective-III)

Open Elective

Pre-requisites: Transportation Engineering.

OBJECTIVES:

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

OUTCOMES:

At the end of the course student is able to

- Students could learn about the various components involved in planning, design, construction and operation of railways and waterways.
- In case of railways the need of tunnels and the related surveys, operation and construction is covered.
- Pros and cons of railways and waterways in terms of construction, operations, maintenance and economics are learnt.
- Urban rail transportation as mass transportation facility is studied apart from the vital role played by harbour structure for the import and export of goods.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1									-	2	2
CO2	3	2	2	1									-	2	-
CO3	1	2	2	2									-	2	-
CO4	-	2	1	2									-	2	1

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 Centrury 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.

IV B.Tech, I-Sem (CE)

T C 3+1* 3

(A0132157) ENVIRONMENTAL IMPACT ASSESSMENT & MANAGEMENT (Elective-III) Open Elective

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 actionsimpacts.
- Also focuses on methods of auditing for any project whose actions have several consequences on environmental quality over the proposed area.

OUTCOMES:

At the end of the course student is able to

- ✤ Knowledge on impact of environmental pollution
- * Know defects on buildings due to environmental pollution, prevent and control the same defect
- * Knowledge on Assessment of soil and ground water pollution
- ✤ Know about the environmental impact assessment methods

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		1	1	-	-	2	1	-	1	-	-	1	-	-
CO2	3	1	2	1	-	-	1		-	1	-	-	1	-	-
CO3	2	2	2	1	-	-			-		-	-	1	-	-
CO4	3	3	1		-	-			-		-	-	1	-	-
Avg.	3	2	2	1	-	1	1	1	-		-	-	1	-	-

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.

IV B.Tech, I-Sem (CE)

T C 3+1* 3

(A0133157) BUILDING INFORMATION MODELLING (Elective-III) Open Elective

OBJECTIVES

- Building Information Modelling (BIM) is argued to be a catalyst for change poised to reduce industry's fragmentation, improve its efficiency, effectiveness and lower the high costs of inadequate interoperability.
- To demonstrate how construction management functions are impacted by new technologies and helps students understand the fundamentals and practical uses of the state of the art information technologies and tools in the building industry. It also promotes project-based learning through cross-disciplinary, geographically distributed, and virtual project team collaboration

OUTCOMES

At the end of the course student are able to

- ✤ Improve Collaboration
- Resolve Conflict
- ♦ Apply the Software Tools, for analysis & designing of models

•	 Pro 	motes	project	t-based	learni	ng thro	ugh cr	oss-dis	ciplina	ry	

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	2	2	1	2	2	2	3	2	2	2
CO2	3	2	3	3	3	2	2	1	2	2	2	3	2	2	2
CO3	3	2	3	3	3	2	2	1	2	2	2	3	2	2	2
CO4	3	2	3	2	3	2	2	1	2	2	2	3	2	2	2

UNIT I

Introduction, The Settings for BIM, Current Practice, Legal Considerations

UNIT II

Building Information Modeling, Introduction, BIM Concepts, BIM Planning, BIM Implementation

UNIT III

Software Tools, Introduction, Modeling Tools, Model Analysis, Specific Software Options

UNIT IV

Learning BIM, Introduction, Learning Methods, Skill Set, The learners

UNIT V

Case Studies, DPR Construction, RQ Construction,

Case Stud

UNIT VI

Case Studies

TEXT BOOKS:

1. Turner Construction, Seattle, Washington, Gregory P. Luth & Assoc. Inc, Webcor Builders

IV B.Tech, I-Sem (CE)

T C 3+1* 3

RGM-R-2015

(A0134157) PAVEMENT ANALYSIS AND DESIGN

(Elective-IV)

Pre-requisites: Geotechnical Engineering - I, Engineering Geology and Transportation Engineering. **OBJECTIVES:**

The course objective covers the design of flexible pavements, design of Rigid pavements, Highway materials, Highway construction

OUTCOMES:

At the end of the course student is able to

- Characterize the response characteristics of soil, Aggregate ,Bitumen
- Analyze flexible and rigid pavements
- Design a flexible and rigid pavement using IRCand AASHTO methods
- Understand the principles of construction and maintains of highways

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-		-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	-	3	-
Avg.	3	3	3	-	-	-	-	-	-	-	-	-	-	3	-

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

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.

$\mathbf{UNIT} - \mathbf{VI}$

Need for Highway Maintenance- Pavement Failures- Failures in Flexible Pavements-Types and Causes-Rigid Pavement Failures- Types and causes- Pavement Evaluation- Benkelman Beam method- Strengthening of Existing Pavements- Overlays-Modern pavement Management systems.

TEXT BOOKS:

- 1. Pavement Analysis and Design,- Yang H. Huang , 2nd Edition, Prentice Hall,2003
- 2. Principles of Pavement Design- E.J. Yoder and M.W. Witzack, Johnwiley & Sons

REFERENCES:

- 1. Pavement Design and Materials- A.T. Papagiannakis and E.A. Masad; Wiley & Sons
- 2. Pavement Engineering: Principles and Practices- Rajib B. Mallick and Tahar El Korchi, CRC Press

Indian Roads Congress (IRC) Specifications:

- 1. IRC Specification: IRC:37-2001 and IRC:37-2012- Guidelines for Design of flexible pavement
- 2. IRC Specification: IRC:58-2001 and IRC:58-2011- Guidelines for Design of plain jointed Rigid pavement for Highways
- 3. IRC Specification: IRC:81-1997- Guidelines for Strengthening of flexible road pavement using Benkelman Beam Deflection Technique
- 4. MoRTH- Specifications for Roads and Bridge works, 5 th Edition, IRC, New Delhi, 2013.

IV B.Tech, I-Sem (CE)

T C 3+1* 3

RGM-R-2015

(A0135157) EXPERIMENTAL STRESS ANALYSIS

(Elective-IV)

Pre-requisites: Strength of Materials and Mathematical Methods. **OBJECTIVES:**

 Discusses the various experimental techniques like photo elasticity, strain gauges, brittle coatings etc for the analysis of problems

OUTCOMES:

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

- Apply principles of elasticity theory to determine stresses and strains.
- Apply theory of elasticity and formulate plane stress and plane strain problems.
- ✤ Apply experimental techniques using strain gauges to solve field problems.
- Understand the concept and application of NDT techniques.
- Understand the concept of brittle coating methods and photo-elasticity.
- Determine the stresses using strain rosette concept.

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2									
CO2	2	2	2									
CO3	2	3	3	2								
CO4	3	3	3	2	2							
CO5	2	3	2		2							
CO6	3	1	2		2							

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 – Isochramic 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.

READING:

- 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.

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY

Autonomous CIVIL ENGINEERING

IV B.Tech, I-Sem (CE)

T C 3+1* 3

RGM-R-2015

(A0136157) FIRE SAFETY ENGINEERING DESIGN OF STRUCTURES (Elective-IV)

Pre-requisites: Concrete Technology

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

OUTCOMES:

At the end of the course student is able to

- Identify the fire risk and understand the methods available to determine the performance of structures or structural elements when subjected to the effects of fire.
- Formulate prescriptive methods when the calculation approach cannot be justified.
- Understand the behavior of different materials at elevated temperatures.
- Analyze the fire resistance capacity of structure when exposed to fire.
- Design concrete, steel , timber elements and composite(steel-concrete) construction

•	Des Des	sign str	uctura	i eleme	ents or	structu	res inv	olving	the use	e or mas	onry, A	luminiui	m or pla	stics.	
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1										3	2	-
CO2	3	2											3	2	-
CO3	3												3	2	-
CO4	2	2	1										3	2	-
CO5			3										3	2	-
CO6			3										3	2	-

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

$\mathbf{UNIT} - \mathbf{VI}$

Masonry, aluminum, plastics and glass- Frames-Assessment and repair of fire-damagedstructures

TEST BOOK:

1. Fire Safety Engineering Design of Structures John A. Purkiss BSc(Eng), PhD- Elsevier publications

IV B.Tech, I-Sem (CE)

T C 3+1* 3

RGM-R-2015

(A0137157) WATERSHED MANAGEMENT (Elective-IV)

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.

OUTCOMES:

At the end of the course student is able to

- Understand the Concept of watershed development.
- ✤ Understand the characteristics of watershed used in watershed management
- Practice watershed management basics, interacting with local interests and dealing with real issues in a practical manner
- Work in the water management field
- Plan watershed management activities and prepare plan of action.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1		-	-	-	-	-	-	-	-	-	1	2	-
CO2	2	2		-	-	-	-	-	-	-	-	-	1	2	-
CO3	2	3	3	-	-	-	-	-	-	-	-	-	1	2	-
CO4	1	2	3	-	-	-	-	-	-	-	-	-	1	2	-
CO5	1	1	3	-	-	-	-	-	-	-	-	-	1	2	

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 MM Das and MD Saikia, PHI Learning Pvt Ltd, New Delhi
- 2. Watershed Management by JVS Murthy, New Age International Publishers.

REFERENCE:

- 1. Water Resource Engineering R.Awurbs and WP James, Prentice Hall Publishers.
- 2. Land and Water Management VVN Murthy, Kalyani Publications.
- 3. Irrigation and Water Management, D.K.Majumdar, Printice Hall of India

IV B.Tech, II-Sem (CE)

С т 3+1* 3

(A0140158) ADVANCED STRUCTURAL ANALYSIS

(Elective-V)

Prerequisites: Strength of materials, Structural Analysis-I & Structural Analysis-II **OBJECTIVES:**

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

OUTCOMES:

At the end of the course student is able to

- Design different elements like retaining structures, water tanks, chimneys and silos independently
- ✤ Use Indian Standards for design
- Understand the codal provision for loading and design standards for bridges.

•	 Des 	sign de	ck slab	and T	beam	bridges	3				
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO1
CO1	3	3	3	-	-		-	1	-	-	-

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-		-	1	-	-	-		1	2	-
CO2	3	3	3	-	-	1	-		-	-	-	2	1	2	-
CO3	3	3	3	-	-		-	2	-	-	-		1	3	-
CO4	3	3	3	-	-	2	-		-	-	-		1	3	-
Avg.	3	3	3	-	-	2	-	2	-	-	-	2	1	3	

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.

Reading:

- 1. Analysis of structures Vol. I & II by Vazrani and Ratwani. Khanna publications.
- Wang C.K. Intermediate Structural Analaysis Tata Mc Graw Hill Publishers, 2010 2.
- 3. Structural Analysis Vol. I & II by Bhavi Katti Vikas Publications.
- 4. Matrix methods of Structural Analysis by Pandit and Gupta Tata Mc.Graw Hill

IV B.Tech, II-Sem (CE)

T C 3+1* 3

(A0141158) INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT (Elective-V)

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.

OUTCOMES:

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

- Analyze the quantity of industrial wastewater, sludge, solid mass produced
- Suggest suitable treatment techniques to treat and dispose industrial wastes
- Learn field and on site knowledge of different industries, their operations, techniques of waste treatment, disposal etc.
- Employ the case studies knowledge for any relevant projects

*	Have K	nowled	ge abo	ut adva	ncea w	astewa	ter trea	tment a	and reu	se					
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3				3	1							1	3
CO2	3	2	2			3	1							1	3
CO3	3	2	2			3	1							1	3
CO4	3	1	2			3	1							1	3
CO5	3	2	2			3	1							1	3

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 - Photo catalysis - 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 industrial Estates Industrial - Tanneries - Pulp and paper - metal finishing - Petroleum Refining - Chemical industries - Sugar and Distilleries - Industrial Estates - 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.

IV B.Tech, II-Sem (CE)

Т	С
3+1*	3

RGM-R-2015

(A0142158) CONSTRUCTION METHODS & EQUIPMENT (Elective-V)

OBJECTIVES:

- Describe the different types of construction equipment and understand operations of various construction equipment.
- Demonstrate an understanding of construction equipment selection, cycle times, production rates and costs.
- Understand the fundamentals of engineering properties of moving earth, material properties, construction methods focusing on equipment-intensive construction activities.
- Estimate and Perform the analysis needed to determine costs and productions of given construction equipment. Enable selection of right equipment for a job with minimum cost.
- Learn how to apply engineering fundamentals and analyses to the planning, selection and utilization of construction equipment

OUTCOMES:

At the end of the course student is able to

- Understand operations of various construction equipments
- Understand construction project control processes
- * The total construction process from inspection of the idea through construction and start up
- Construction equipment should be selection and use to produce the intended quality in the most costeffective manner

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2											3	2	1
CO2	3	2											3	2	1
CO3	3	2											3	2	1
CO4	3	2											3	2	1
Avg.	3	2											3	2	1

UNIT-I:

Equipment Economics - Equipment records, Cost of Capital, Elements of ownership Cost, Operating Cost, Replacement Decisions, Rent and Lease Considerations.

UNIT-II

Planning for Earthwork Construction - Planning, Graphical Presentation of Earthwork, Earthwork Quantities, Mass Diagram, Pricing Earthwork Operations.

UNIT-III

Compaction and Stabilization Equipment - Compaction of Soil and rock, Types of Compacting Equipment, Dynamic Compaction, Stabilizing soils with Lime, Cement Soil Stabilization.

UNIT-IV

Mobile Equipment Power Requirements - Required Power, Available power, Usable power, Performance Charts.

Dozers, Scrapers, Excavators - Introduction, Performance Characteristics of Dozers, Pushing Material, Land Clearing, Scraper types, operation, Performance Charts, Production cycle, Hydraulic Excavators, Shovels, Hoes.

UNIT -V

Trucks and Hauling Equipment, Finishing Equipment - Trucks, productivity, Performance Calculations, Graders, Trimmers.

UNIT-VI

Concrete and Concrete Equipment, Cranes, Piles and Pile-Driving Equipment, Planning for Building Construction - Concrete Mixtures, Batching of Concrete, Placing of Concrete.

READING:

- 1. Peurifoy R.L, Ledbetter W.B, and Schexnayder C, "Construction Planning Equipment and Methods ", 5th Edition, McGraw Hill, Singapore, 1995.
- 2. Sharma S.C, "Construction Equipment and Management ", Khanna Publishers, 1988.

IV B.Tech, II-Sem (CE)

T C 3+1* 3

RGM-R-2015

(A0147158) REHABILITATION OF STRUCTURES

(Elective-V)

Prerequisites: Concrete Technology and Neo Construction Materials **OBJECTIVES:**

To study damages, repair, rehabilitation of structures

OUTCOMES:

At the end of the course student are able to

- ✤ Apply Non Destructive Testing techniques to field problems
- ✤ Assess strength and material deficiency in concrete structures
- Suggest methods and techniques used in repairing / strengthening existing concrete structures
- ✤ Apply cost effective retrofitting strategies for repairs in buildings

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	2	1	2	2	2	3	3	2	3
CO2	3	3	3	3	3	2	2	1	2	2	2	3	3	2	3
CO3	3	3	3	3	3	2	2	1	2	2	2	3	3	2	3
CO4	3	3	3	2	2	2	2	1	2	2	2	3	3	2	2

UNIT I

Failure of Structures: Review of the construction theory – performance problems – responsibility and accountability.

Case studies – learning from failures – causes of distress in structural members –Design and material deficiencies – over loading

UNIT II

Diagnosis and Assessment of Distress: Diagnosis and Assessment of Distress: Visual inspection – non destructive tests – ultrasonic pulse velocity method – rebound hammer technique – ASTM classifications – pullout tests – Bremor test – Windsor probe test

UNIT III

Crack patterns- crack detection techniques – case studies – single and multistory buildings – Fiber optic method for prediction of structural weakness assessments

UNIT IV

Environmental Problems: Effect of corrosive environments, chemical and marine environments – pollution and carbonation problems – detection and measurement of corrosion durability of RCC structures.

UNIT V

Natural Hazards Problems: damage due to earthquakes and strengthening of buildings – provisions of BIS 1893 and 4326.

UNIT VI

Modern Techniques of Retrofitting: Structural elements - first aid after a disaster – gunitin, jacketing– use of chemicals in repair – application of polymers – Ferro-cement, fiber composites and fiber reinforced concretes as rehabilitation materials – strengthening by pre-stressing.

Case studies Of Retrofitting: s bridges – water tanks – cooling towers – heritage buildings – high rise buildings **READING:**

- 1. Dovkaminetzky, Design and Construction Failures, Galgotia Publication, New Delhi, 2001
- 2. Jacob Feld and Kenneth L Carper, Structural Failures, Wiley Europe.
- 3. Raikar R.N., Diagnosis and treatment of Structures in Distress
- 4. Raina V.K., Bridge Rehabilitation
- 5. Ransom W.H., Building Failures Diagnosis and Avoidance -
- 6. Kenneth and Carper, Forensic Engineering.

IV B.Tech, II-Sem (CE)

T C 3+1* 3

RGM-R-2015

(A0143158) GROUND IMPROVEMENT TECHNIQUES

(Elective-VI)

OBJECTIVES:

- Certain soils do 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.

OUTCOMES:

At the end of the course student is able to

- ♦ Understand the Mechanical, Hydraulic and Chemical Soil Modification Techniques
- Analyze, Select & Design the Mechanical, Hydraulic & Chemical Modification technique based on the problem
- Understand the Thermal & Soil Reinforcement techniques
- Analyze, Select & Design the Thermal & Soil Reinforcement techniques based on the problem
- Understand expansive soil problems, propose tests and suggest remedial measure for expansive soil problem

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3											2	2	2
CO2			3	3	1								2	2	2
CO3	3	3											2	2	2
CO4			3	3	1								2	2	2
CO5	3	3	3										2	2	2
Avg.	3	3	3	3	1								2	2	2

UNIT –I

Mechanical modification

- Compaction methods and compaction control
- Stone columns Deep compaction
- Deep dynamic compaction
- Vibro techniques (displacement/replacement)
- Blasting

UNIT-II

Hydraulique Modification

- Sand Drains
- Wick Drains
- Vacuum consolidation
- Dewatering

UNIT-III:

Chemical Modification

- Shallow soil stabilization
- Mixing technologies (dry mixing, wet mixing, jet mixing, mass mixing)
- Grouting technologies
- Electro-chemicals

UNIT-IV:

Thermal Modification

- Ground freezing
- Vitrification

UNIT-V

Soli Renforcement Technologies

- Mechanically stabilized earth
- Foundation and base reinforcement.
- **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 Jercy, USA

IV B.Tech, II-Sem (CE)

T C 3+1* 3

RGM-R-2015

(A0144158) ADVANCED FOUNDATION ENGINEERING (Elective-VI)

OBJECTIVES:

Provide through insight about shallow foundations, deep foundations, sheet pile walls and solutions in problematic soils.

OUTCOMES:

At the end of the course student is able to

- Understand the shallow, deep foundations , sheet pile walls & problematic soils
- Analyze, Select & Design the shallow (including structural design) based on structure.
- Analyze, Select & Design the deep foundation (including structural design) based on structure and also sheet pile walls.
- Suggest & Design remedial techniques for problematic soils

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3											3	2	1
CO2			3	3	3								3	2	1
CO3			3	3	3								3	2	1
CO4		3	3										3	2	1
Avg.	3	3	3	3	3								3	2	1

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

DEEPFOUNDATIONS-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 achored 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- Shamsher Prakash, Gopal Ranjan and Swami Saran.
- 2. Foundation Design-Teng.
- 3. Geotechnical Engg. C. Venkatramaiah.
- 4. Geo technical engineering by V.N.S.Murthy, CRCPress, 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 Brije.M.Das, Cengage pubilications, New Delhi.
- 3. Foundations Design and Construction Tomlinson.

IV B.Tech, II-Sem (CE)

T C 3+1* 3

(A0145158) SOIL DYNAMICS AND MACHINE FOUNDATIONS

(Elective-VI)

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.

OUTCOMES:

At the end of the course student is able to

- ↔ Understand vibration systems and find the dynamic soil properties
 - Find the dynamic soil properties
 - Understand & Design vibration isolation.
 - ✤ Understand, design & execute the machine foundations

				<u> </u>											
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3		2								2	1	
CO2	3	3	3										2	1	1
CO3	3	3	3		2								2	1	
CO4	3	3	3		2								2	1	
Avg.	3	3	3		2								2	1	1

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.

$\mathbf{UNIT} - \mathbf{IV}$

Machine Foundations: Types, Design criteria, permissible amplitudes and bearing pressure. Block foundation: Degrees of freedom - analysis under different modes of vibration

$\mathbf{UNIT} - \mathbf{V}$

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.

$\mathbf{UNIT} - \mathbf{VI}$

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 Shamsher 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 Jersy, USA.

IV B.Tech, II-Sem (CE)

T C 3+1* 3

(A0146158) EARTHQUAKE RESISTANT DESIGN

(Elective-VI)

Pre-requisites: Physics, Mathematical Methods and Engineering Mechanics. **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.

OUTCOMES:

At the end of the course student is able to

- Understand about the Earthquake Phenomenon and its features related to Earthquake terminology.
- Apply the various vibrations on SDOF and MDOF systems.
- ✤ Analyze any structure subjected to Earthquake.
- Design of various structures subjected to earthquake.
- ✤ Get knowledge regarding codal methods of analysis.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	1	3	-	-	-	-	-	2	2	2
CO2	3	2	-	-	-	2	-	-	-	-	-	-	3	1	3
CO3	1	3	1	1	2	-	-	-	-	-	-	-	3	2	3
CO4	-	-	3	2	3	-	2	-	-	-	-	-	3	3	3
CO5	-	-	2	3	1	-	2	-	-	-	-	-	3	3	3
Avg.	2	2	2	2	2	2	2						3	2	3

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.

$\mathbf{UNIT} - \mathbf{IV}$

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

Analysis for Earth Quake Loads: IS: 1893-2002- Seismic Coefficient method- modal analysis- Applications to multi-storied building frames – water tanks – chimneys

$\mathbf{UNIT} - \mathbf{VI}$

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

Reading:

- 1. Dynamics of Structures by A.K.Chopra Pearson Education, Indian Branch, Delhi.
- 2. Dynamics of Structures Clough & Penzien, McGraw Hill International Edition.
- 3. Earthquake Resistant Design of Structures Pankaj Agarwal & Manish Shrikhande Prentice Hall of India, New Delhi
- 4. **IS Codes:** IS: 1893, IS: 4326 and IS: 13920.