ACADEMIC REGULATIONS

COURSE STRUCTURE AND

DETAILED SYLLABUS

CIVIL ENGINEERING

B.TECH 4 YEAR UG COURSE

(Applicable for the batches admitted from 2016-2017)

REGULATION: R16

(I, II, III & IV Year Syllabus)

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
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J.B. INSTITUTE OF ENGIEERING & TECHNOLOGY
UGC AUTONOMOUS

Institute Vision & Mission

Vision

To be a centre of excellence in engineering and management education, research and application of knowledge to benefit society with blend of ethical values and global perception.

Mission:

- To provide world class engineering education, encourage research and development.
- To evolve innovative applications of technology and develop entrepreneurship.
- To mould the students into socially responsible and capable leaders.

DEPARTMENT OF CIVIL ENGINEERING

Department Vision and Mission

Vision

To ensure that every learner has the feeling 'I am not just being taught, I am being educated'.

Mission

- To achieve academic excellence by imparting sound technical knowledge based on strong fundamentals of science and engineering that leads to higher education and research.
- To mould the learners into thorough professionals with the confidence of standing up as entrepreneurs in a fiercely competitive world.
- To leave the learners with a wide range of choices for employment and imparting social relevance to the profession by inculcating inquisitive spirit and ethical values.

J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (JBIET)
UGC AUTONOMOUS
Bhaskar Nagar, Moinabad, Hyderabad – 500075, Telangana, India

ACADEMIC REGULATIONS FOR B.TECH. REGULAR STUDENTS

WITH EFFECT FROM THE ACADEMIC YEAR 2016-17 (R-16)

1.0 Under-Graduate Degree Programme in Engineering & Technology (UGP in E&T)

1.1 JBIET offers a 4-year (8 semesters) **Bachelor of Technology** (B.Tech.) degree programme, under Choice Based Credit System (CBCS) with effect from the academic year 2016-17 in the following branches of Engineering:

Sl. No.	Branch
1	Civil Engineering
2	Electrical and Electronics Engineering
3	Mechanical Engineering
4	Electronics and Communication Engineering
5	Computer Science and Engineering
6	Information Technology
7	Electronics and Computer Engineering
8	Mining Engineering

2.0 Eligibility for Admission

2.1 Admission to the under graduate programme shall be made either on the basis of the merit rank obtained by the qualified candidate in entrance test conducted by the Telangana State Government (EAMCET) or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the government from time to time.

2.2 The medium of instructions for the entire under graduate programme in E&T will be **English** only.

3.0 B.Tech. Programme structure

3.1 A student after securing admission shall pursue the under graduate programme in B.Tech. in a minimum period of **four** academic years (8 semesters), and a maximum period of **eight** academic years (16 semesters) starting from the date of commencement of first year first semester, failing which student shall forfeit seat in B.Tech course.

Each semester is structured to provide 24 credits, totalling to 192 credits for the entire B.Tech. programme. Each student shall secure 192 credits (with CGPA ≥ 5) required for the completion of the under graduate programme and award of the B.Tech. degree.

3.2 UGC/ AICTE specified definitions/ descriptions are adopted appropriately for various terms and abbreviations used in these academic regulations/ norms, which are listed below.

3.2.1 Semester scheme

Each under graduate programme is of 4 academic years (8 semesters) with the academic year being divided into two semesters of 22 weeks (≥ 90 instructional days) each, each semester having - '**Continuous Internal Evaluation (CIE)**' and '**Semester End Examination (SEE)**'. **Choice Based Credit System (CBCS)** and **Credit Based Semester System (CBSS)** as indicated by UGC and curriculum / course structure as suggested by AICTE are followed.

3.2.2 Credit courses

All subjects/ courses are to be registered by the student in a semester to earn credits which shall be assigned to each subject/ course in an L: T: P: C (lecture periods: tutorial periods: practical periods: credits) structure based on the following general pattern.

1. One credit for one hour/ week/ semester for theory/ lecture (L) courses.
2. One credit for two hours/ week/ semester for laboratory/ practical (P) courses or Tutorials (T).

Courses like Environmental Studies, Professional Ethics, Gender Sensitization lab are identified as **mandatory courses**. These courses **will not carry any credits**.

3.2.3 Subject Course Classification

All subjects/ courses offered for the under graduate programme in E&T (B.Tech. degree programmes) are broadly classified as follows. JBIET has followed almost all the guidelines issued by AICTE/UGC.

S. No.	Broad Course Classification	Course Group/ Category	Course Description
1	Foundation Courses (FnC)	BS – Basic Sciences	Includes mathematics, physics and chemistry subjects
2		ES - Engineering Sciences	Includes fundamental Engineering subjects
3		HS – Humanities and Social sciences	Includes subjects related to humanities, social sciences and management
4	Core Courses (CoC)	PC – Professional Core	Includes core subjects related to the parent discipline/ department/ branch of Engineering.
5		Project Work	B.Tech. project or UG project or UG major project
6		Industrial training/ Mini- project	Industrial training/ Internship/ UG Mini-project/Mini-project

7		Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch of Engineering.
8	Elective Courses (EℓC)	PE – Professional Electives	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.
9		OE – Open Electives	Elective subjects which include interdisciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering.
10	Mandatory Courses (MC)	-	Mandatory courses (non-credit)

4.0 Course registration

4.1 A 'faculty advisor or counsellor' shall be assigned to a group of 15 students, who will advise student about the under graduate programme, its course structure and curriculum, choice/option for subject s/ courses, based on their competence, progress, pre-requisites and interest.

4.2 The academic section of the college invites '**registration forms**' from students before the beginning of the semester through 'on-line registration', ensuring 'date and time stamping'. The on-line registration requests for any 'current semester' shall be **completed before the commencement of SEEs (Semester End Examinations) of the 'preceding semester'**.

4.3 A student can apply for **on-line** registration, **only after** obtaining the '**written approval**' from faculty advisor/counsellor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with Head of the Department, faculty advisor/ counsellor and the student.

4.4 A student may be permit ted to register for the subjects/ courses of **choice** with a total of 24 credits per semester (minimum of 20 credits and maximum of 28 credit s per semester and permitted deviation of ± 17%), based on **progress** and SGPA/ CGPA, and completion of the '**pre-requisites'** as indicated for various subjects/ courses, in the department course structure and syllabus contents. However, a **minimum** of 20 credits per semester must be registered to ensure the '**studentship**' in any semester.

4.5 Choice for 'additional subjects/ courses' to reach the maximum permissible limit of 28 credits (above the typical 24 credit norm) must be clearly indicated, which needs the specific approval and sig nature of the faculty advisor/ counsellor.

4.6 If the student submits ambiguous choices or multiple options or erroneous entries during **on-line** registration for the subject(s) / course(s) under a given/ specified course group/ category as listed in the course structure, only the first mentioned subject/ course in that category will be taken into consideration.

4.7 Subject/ course options exercised through **on-line** registration are fin al and **cannot** be changed or inter-changed; further, alternate choices also will not be considered. However, if the subject/ course that has already been listed for registration b y the Head of the Department in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice either for a new subject (subject to offering of such a subject), or for another existing subject (subject to availability of seats). Such alternate arrangements will be made by the head of the department, with due notification and time-framed schedule, within the **first week** after the commencement of class-work for that semester.

4.8 Dropping of subjects/courses may be permitted, only after obtaining prior approval from the faculty advisor/counsellor (subject to retaining a minimum of 20 credits), '**within a period of 15 days**' from the beginning of the current semester.

4.9 Open electives: The students have to choose one open elective (OE -I) in III year I semester, one (OE-II) in III year II semester, and one (OE-III) in IV year II semester, from the list of open electives given. However, the student cannot opt for an open elective subject offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.

4.10 Professional electives: students have to choose professional elective – I (PE-I), professional elective – II (PE-II) in III year II semester, Professional electives – III (PE-III), Professional electives – IV(PE-IV) in IV year I semester, Professional electives – V (PE-V), Professional electives – VI (PE-VI) in IV year II semester, from the list of professional electives given. However, the students may opt for professional elective subjects offered in the related area.

5.0 Subjects/courses to be offered

5.1 A typical section (or class) strength for each semester shall be 60.

5.2 A subject/ course may be offered to the students, **only if** a minimum of 20 students (1/3 of the section strength) opt for it. The maximum strength of a section is limited to 80 (60 + 1/3 of the section strength).

5.3 More than **one faculty member** may offer the **same subject** (lab/ practical may be included with the corresponding theory subject in the same semester) in any semester. However, selection of choice for students will be based on - '**first com e first serve** basis and CGPA criterion' (i.e. the first focus shall be on early **on-line entry** from the student for registration in that semester, and the second focus, if needed, will be on CGPA of the student).

5.4 If more entries for registration of a subject come into picture, then the Head of Department concerned shall decide, whether or not to offer such a subject/ course for **two (or multiple) sections**.

6.0 Attendance requirements:

6.1 A student shall be eligible to appear for the semester end examinations, if student acquires a minimum of 75% of attendance in aggregate of all the subjects/ courses (excluding attendance in mandatory courses Environmental Science, Professional Ethics, Gender Sensitization Lab, NCC/ NSO and NSS) for that semester.

6.2 Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on genuine and valid grounds, based on the student's representation with supporting evidence.

6.3 A stipulated fee shall be payable towards condoning of shortage of attendance.

6.4 Shortage of attendance below 65% in aggregate shall in **no** case be condoned.

6.5 Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall stand cancelled. They will not be promoted to the next semester. They may seek re-registration for all those subjects registered in that semester in which student was detained, by seeking re-admission into that semester as and when offered; in case if there are any professional electives and/ or open electives, the same may also be re-registered if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the **same** set of elective subjects offered under that category.

6.6 A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class.

7.0 Academic requirements

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

7.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course, if student secures not less than 35 % marks (26 out of 75 marks) in the semester end examination, and a minimum of 40% of marks in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of letter grades, this implies securing **'C'** grade or above in that subject/ course.

7.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to UG mini-project and seminar, if student secures not less than 40% marks (i.e. 40 out of 100 allotted marks) in each of them. The student would be treated as failed, if student (i) does not submit a report on UG mini-project, or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) does not present the seminar as required in the IV year I Semester, or (iii) secures less than 40% marks in UG mini-project/ seminar evaluations.

Student may reappear once for each of the above evaluations, when they are scheduled again; if student fails in such 'one reappearance' evaluation also, student has to reappear for the same in the next subsequent semester, as and when it is scheduled.

7.3 Promotion Rules

S. No.	Promotion	Conditions to be fulfilled
1	First year first semester to first year second semester	Regular course of study of first year first semester.
2	First year second semester to second year first semester	i. Regular course of study of first year second semester. ii. Must have secured at least 24 credits out of 48 credits i.e., 50% of credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Second year first semester to second year second semester	Regular course of study of second year first semester.
4	Second year second semester to third year first semester	i. Regular course of study of second year second semester. ii. Must have secured at least 58 credits out of 96 credits i.e., 60% of credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester to third year second semester	Regular course of study of third year first semester.
6	Third year second semester to fourth year first semester	i. Regular course of study of third year second semester. ii. Must have secured at least 86 credits out of 144 credits i.e., 60% of credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

7.4 A student shall register for all subjects covering 192 credits as specified and listed in the course structure, fulfils all the attendance and academic requirements for 192 credits, 'earn all 192 credits' by securing SGPA $\geq$ 5.0 (in each semester) and CGPA (at the end of each successive semester) $\geq$ 5.0 to successfully complete the under graduate programme.

7.5 After securing the necessary 192 credits as specified for the successful completion of the entire under graduate programme, the student can avail exemption of two subjects up to 6 credits, that is, one open elective and one professional elective subject or two professional elective subjects for optional drop out from these 192 credits earned;

resulting in 186 credits for under graduate programme performance evaluation, i.e., the performance of the student in these 186 credits shall alone be taken into account for the calculation of 'the final CGPA (at the end of under graduate programme, which takes the SGPA of the IV year II semester into account)' , and shall be indicated in the grade card of IV year II semester. However, the performance of student in the earlier individual semesters, with the corresponding SGPA and CGPA for which grade cards have already been given will not be altered.

7.6 If a student registers for some more '**extra subjects'** (in the parent department or other **departments**/branches of Engineering.) other than those listed subjects totaling to 192 credits as specified in the course structure of his department, the performances in those '**extra subjects**' (although evaluated and graded using the same procedure as that of the required 192 credits) will not be taken into account while calculating the SGPA and CGPA. For such '**extra subjects'** registered, % of marks and letter grade alone will be indicated in the grade card as a performance measure, subject to completion of the attendance and academic requirements as stated in regulations 6 and 7.1 – 7.5 above.

7.7 A student eligible to appear in the end semester examination for any subject/ course, but absent from it or failed (thereby failing to secure **'C'** grade or above) may reappear for that subject/ course in the supplementary examination as and when conducted. In such cases, CIE assessed earlier for that subject/ course will be carried over, and added to the marks to be obtained in the SEE supplementary examination for evaluating performance in that subject.

7.8 A student **detained in a semester due to shortage of attendance, may be re-admitted when the same semester is offered in the next academic year for fulfilment of academic requirement s**. The academic regulations under which student has been readmitted shall be applicable. However, no grade allotments or SGPA/ CGPA calculations will be done for the entire semester in which student has been detained.

7.9 A student detained **due t o lack of credits, shall be promoted to the next academic year only after acquiring the required academic credits.** The academic regulations under which student has been readmitted shall be applicable to him.

8.0 Evaluation - Distribution and Weightage of marks

8.1 The performance of a student in every subject/course (including practical's and UG major project) will be evaluated for 100 marks each, with 25 marks allotted for CIE (Continuous Internal Evaluation) and 75 marks for SEE (Semester End-Examination).

8.2 For theory subjects, during a semester, there shall be two mid-term examinations. Each mid-term examination consists of one objective paper, one descriptive paper and one assignment. The objective paper and the essay paper shall be for 10 m arks each with a total duration of 1 hour 20 minutes (20 minutes for objective and 60 minutes for essay paper). The objective paper is set with 20 bits of multiple choice, fill-in the blanks and matching type of questions for a total of 10 marks. The essay paper shall contain 4 full

questions out of which, the student has to answer 2 questions, each carrying 5 marks. While the first mid-term examination shall be conducted on 50% of the syllabus, the second mid-term examination shall be conducted on the remaining 50% of the syllabus. Five marks are allocated for assignments (as specified by the subject teacher concerned). The first assignment should be submitted before the conduct of the first mid-examination, and the second assignment should be submitted before the conduct of the second mid-examination. The total m arks secured by the student in each mid-term examination are evaluated for 25 marks, and the average of the two mid-term examinations shall be taken as the final marks secured by each student in internals/sessionals. If any student is absent from any subject of a mid-term examination, an on-line test will be conducted for him by the university. The details of the question paper pattern are as follows,

- The end semester examinations will be conducted for 75 marks consisting of two parts viz. i) **Part- A** for 25 marks, ii) **Part - B** for 50 marks.
- Part-A is compulsory question which consists of ten sub-questions. The first five sub-questions are from each unit and carry 2 marks each. The next five sub-questions are one from each unit and carry 3 marks each.
- Part-B consists of five questions (numbered from 2 to 6) carrying 10 marks each.
- Each of these questions is from one unit and may contain sub-questions. For each question there will be an “either” “or” choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

8.3 For practical subjects there shall be a continuous internal evaluation during the semester for 25 sessional marks and 75 semester end examination marks. Out of the 25 marks for internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 10 marks conducted by the laboratory teacher concerned. The semester end examination shall be conducted with an external examiner and the laboratory teacher. The external examiner s hall be appointed from the clusters of colleges which are decided by the examination branch of the university

8.4 For the subject having design and/or drawing, (such as engineering graphics, engineering drawing, machine drawing) and estimation, the distribution shall be 25 marks for continuous internal evaluation (15 marks for day-to-day work and 10 m arks for internal tests) and 75 marks for semester end examination. There shall be two internal tests in a semester and the average of the two shall be considered for the award of marks for internal tests.

8.5 There shall be an UG mini-project, in collaboration with an industry of their specialization. Students will register for this immediately after III year II semester examinations and pursue it during summer vacation. The UG mini -project shall be

submitted in a report form and presented before the committee in IV year I semester. It shall be evaluated for 100 marks. The committee consists of an external examiner, Head of the Department, supervisor of the UG mini-project and a senior faculty member of the department. There shall be no internal marks for UG mini-project

8.6 There shall be a seminar presentation in IV year II semester. For the seminar, the student shall collect the information on a specialized topic, prepare a technical report and submit it to the department. It's hall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 100 marks. There shall be no semester end examination for the seminar.

8.7 Out of a total of 100 m arks for the UG major project, 25 marks shall be allotted for internal evaluation and 75 marks for the end semester examination (viva voce). The end semester examination of the UG major project shall be conducted by the same committee as appointed for the UG mini-project. In addition, the UG major project supervisor shall also be included in the committee. The topics for UG mini project, seminar and UG major project shall be different from one another. The evaluation of U G major project shall be made at the end of IV year II semester. The internal evaluation shall be on the basis of two seminars given by each student on the topic of UG major project.

8.8 The laboratory records and internal test papers shall be preserved in the institution for two Semesters.

8.9 For mandatory courses viz. environmental studies, professional ethics and gender sensitization lab, a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in the continuous internal evaluation for passing the subject/course.

8.10 For mandatory courses NCC/ NSO and NSS, a '**satisfactory participation certificate'** shall be issued to the student from the authorities concerned, only after securing ≥ 65% attendance in such a course.

8.11 No marks or letter grade shall be allotted for all mandatory/non-credit courses.

9.0 Grading procedure

9.1 Marks will be awarded to indicate the performance of student in each theory subject, laboratory / practical's, seminar, UG mini project and UG major project. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 8 above, a corresponding letter grade shall be given.

9.2 As a measure of the performance of student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks shall be followed:

% of Marks Secured in a Subject/Course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
Greater than or equal to 90%	O (Outstanding)	10
80 and less than 90%	A^+ (Excellent)	9
70 and less than 80%	A (Very Good)	8
60 and less than 70%	B^+ (Good)	7
50 and less than 60%	B (Average)	6
40 and less than 50%	C (Pass)	5
Below 40%	F (FAIL)	0
Absent	Ab	0

9.3 A student obtaining '**F'** grade in any subject shall be deemed to have '**failed'** and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier.

9.4 A student who has not appeared for examination in any subject, '**Ab'** grade will be allocated in that subject, and student shall be considered '**failed'**. Student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered.

9.5 A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.

9.6 A student earns grade point (GP) in each subject/ course, on the basis of the letter grade secured in that subject/ course. The corresponding 'credit points' (CP) are computed by multiplying the grade point with credits for that particular subject/ course.

Credit points (C P) = grade point (GP) x credits …. For a course

9.7 The student passes the subject/ course only when **GP $\geq$ 5 ('C' grade or above)**

9.8 The semester grade point average (SGPA) is calculated by dividing the sum of credit points ($\sum$CP) secured from all subjects/courses registered in a semester, by the total numbers of credits registered during that semester. SGPA is rounded off to **two** decimal

places. SGPA is thus computed as

SGPA = $\{\sum_{i=1}^{N} C_i G_i\}$ **/** $\{\sum_{i=1}^{N} C_i\}$ **. . . . . For each semester.**

Where 'i' is the subject indicator index (takes into account all subjects in a semester), 'N' is the no. of subjects **'registered'** for the semester (as specifically required and listed under the course structure of the parent department). $\mathbf{G_i}$ is the no. of credits allotted to the i^{th} subject, and $\mathbf{G_i}$ represents the grade points (GP) corresponding to the letter grade awarded for that i^{th} subject.

9.9 The cumulative grade point average (CGPA) is a measure of the overall cumulative performance4 of a student in all semesters considered for registration. The CGPA is the ratio of the total credit points secured by a student in all registered courses in all semesters, and the total number of credits registered in all the semesters. CGPA is rounded off to two decimal places. CGPA is thus computed from the I year II semester onwards at the end of each semester as per the formula

CGPA = $\{\sum_{j=1}^{M} C_j G_j\}$ **/** $\{\sum_{j=1}^{N} C_j\}$ **. . . . . For all S semester registered (i.e., up to and inclusive of S semester, S** $\geq$ **2),**

Where '**M'** is the total no. of subjects (as specifically required and listed under the course structure of the parent department) the student has **'registered'** i.e., from the 1^{st} semester onwards up to and inclusive of the 8^{th} semester, **'j'** is the subject indicator index (takes into account all subjects for 1 to 8 semesters), C_j is the no. of credits allotted to the j^{th} subject, and G_j represents the grade points (GP) corresponding to the letter grade awarded for the j^{th}subject. After registration and completion of first year first semester, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	A	8	4 x 8 = 32
Course 2	4	O	10	4 x 10 = 40
Course 3	4	C	5	4 x 5 = 20
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	3	C	5	3 x 5 = 15
	21			152

SGPA = 152/21 = 7.24

Illustration of calculation of SGPA:

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
I Year I Semester				
Course 1	4	A	8	4 x 8 = 32
Course 2	4	A+	9	4 x 9 = 36
Course 3	4	B	6	4 x 6 = 24
Course 4	3	O	10	3 x 10 = 30
Course 5	3	B+	7	3 x 7 = 21
Course 6	3	A	8	3 x 8 = 24
I Year II Semester				
Course 7	4	B+	7	4 x 7 = 28
Course 8	4	O	10	4 x 10 = 40
Course 9	4	A	8	4 x 8 = 32
Course 10	3	B	16	3 x 6 = 18
Course 11	3	C	5	3 x 5 = 15
Course 12	3	A+	9	3 x 9 = 27
Total Credits =	42		Total Credit Points=	327

CGPA = 327/42 = 7.79

9.10 For merit ranking or comparison purposes or any other listing, **only** the '**rounded off'** values of the CGPAs will be used.

9.11 For calculations listed in regulations 9.6 to 9.9, performance in failed subjects/ courses (securing **F** grade) will also be taken into account, and the credits of such subjects/ courses will also be included in the multiplications and summations. After passing the failed subject(s) newly secured letter grades will be taken into account for calculation of SGPA and CGPA. However, mandatory courses will not be taken into consideration.

10.0 Passing standards

10.1 A student shall be declared successful or 'passed' in a semester, if student secures a GP ≥ 5 ('C' grade or above) in every subject/course in that semester (i.e. when student gets an SGPA ≥ 5.00 at the end of that particular semester); and a student s hall be declared successful or 'passed' in the entire under graduate programme, only when gets a CGPA ≥ 5.00 for the award of the degree as required.

10.2 After the completion of each semester, a grade card or grade sheet (or transcript) shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (course code, title, no. of credits, and grade earned etc.), credits earned, SGPA, and CGPA.

11.0 Declaration of results

11.1 Computation of SGPA and CGPA are done using the procedure listed in 9.6 to 9.9.

11.2 For final percentage of marks equivalent to the computed final CGPA, the following formula may be used.

% of Marks = (final CGPA – 0.5) x 10

12.0 Award of degree

12.1 A student who registers for all the specified subjects/ courses as listed in the course structure and secures the required number of 192 credits (with CGPA ≥ 5.0), within 8 academic years from the date of commencement of the first academic year, shall be declared to have '**qualified'** for the award of the B.Tech. degree in the chosen branch of Engineering as selected at the time of admission.

12.2 A student who qualifies for the award of the degree as listed in item 12.1 shall be placed in the following classes.

12.3 Students with final CGP A (at the end of the under graduate programme) ≥ 8.00, and fulfilling the following conditions -

(i) Should have passed all the subjects/courses in '**first appearance'** within the first 4 academic years (or 8 sequential semesters) from the date of commencement of first year first semester.

(ii) Should have secured a CGPA ≥ 8.00, at the end of each of the 8 sequential semesters, starting from first year first semester onwards.

(iii) Should not have been detained or prevented from writing the end semester examinations in any semester due to shortage of attendance or any other reason, shall be placed in '**first class with distinction'**.

12.4 Students with final CGP A (at the end of the under graduate program me) ≥ 6.50 but < 8.00, shall be placed in '**first class'**.

12.5 Students with final CGP A (at the end of the under graduate program me) ≥ 5.50 but < 6.50, shall be placed in '**second class'**.

12.6 All other students who qualify for the award of the degree (as per item 12.1), with final CGPA (at the end of the under graduate programme) ≥ 5.00 but < 5.50, shall be placed in '**pass class**'.

12.7 A student with final CGP A (at the end of the under graduate programme) < 5.00 will not be eligible for the award of the degree.

12.8 Students fulfilling the conditions listed under item 12.3 alone will be eligible for award of '**First Rank**' and '**Gold Medal**'.

13.0 Withholding of results

13.1 If the student has not paid the fees to the university/college at any stage, or has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the student may be withheld, and student will not be allowed to go into the next higher semester. The award or issue of the degree may also be withheld in such cases.

14.0 Transitory regulations

14.1 A student who has discontinued for any reason, or has been detained for want of attendance or lack of required credits as specified, or who has failed after having undergone the degree programme, may be considered eligible for re admission to the same subjects/courses (or equivalent subjects/ courses, as the case may be), and same professional electives/open electives (or from set/category of elective s or equivalents suggested, as the case m ay be) as and when they are offered (within the time-frame of 8 years from the date of commencement of student's first year first semester).

15.0 Student transfers

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

15.2 There shall be no transfers from the college/stream to another college.

16.0 Scope

16.1 The academic regulations should be read as a whole, for the purpose of any interpretation.

16.2 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Head of the Institution is final.

16.3 The institution may change or amend the academic regulations, course structure or syllabi at any time if necessary, and the changes or amendments made shall be applicable to all students with effect from the date notified by the JBIET authorities.

J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (JBIET)
UGC AUTONOMOUS
Bhaskar Nagar, Moinabad, Hyderabad – 500075, Telangana, India

Academic Regulations for B.Tech. (Lateral Entry Scheme) w.e.f the A Y 2017-18

1. **Eligibility for award of B. Tech. Degree (LES)**

   The LES students after securing admission shall pursue a course of study for not less than three academic year s and not more than six academic years.

2. The student shall register for 144 credits and secure 144 credits with CGPA ≥ 5 from II year to IV year B.Tech. programme (LES) for the award of B.Tech. degree. **Out of the144 credits secured, the student can avail exemption up to 6 credits**, that is, one open elective subject and one professional elective subject or two professional elective subjects resulting in 138 credits for B.Tech programme performance evaluation**.**
3. The students, who fail to fulfil the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech.
4. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech. (LES).
5. **Promotion Rule:**

S. No	Promotion	Conditions to fulfilled
1	Second year first semester to second year second semester	Regular course of study of second year first semester.
2	Second year second semester to third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 29 credits out of 48 credits i.e., 60% of credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Third year first semester to third year second semester	Regular course of study of third year first semester.
4	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 58 credits out of 96 credits i.e., 60% of credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

6. **All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).**

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

S.No.	**Nature of Malpractice/Improper conduct**	**Punishment**
	If the student:	
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which student is appearing but has not made use of (material shall include any marks on the body of the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in the subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The hall ticket of the student is to be cancelled and sent to the university.
3.	Impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and UG major project) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The student is also debarred for two consecutive

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

	engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeiture of seat.
9.	If student of the college, who is not a student for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all the other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeiture of seat. Person(s) who do not belong to the college will be handed over to police and, a police case will be registered against them.

10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of performance in that subject and all other subjects the student has appeared including practical examinations and UG major project of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the university for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators will be further investigated through a committee and suitable punishment will be given to the students as mentioned by the University guidelines.

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CIVIL ENGINEERING
COURSE STRUCTURE – R16

I B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E110A	Mathematics – I	3	1-0-0	3
2	E110B	Mathematics – II	4	1-0-0	4
3	E110C	Engineering Physics	3	0-0-0	3
4	E110D	Computer Programming in C	3	0-0-0	3
5	E113A	Engineering Mechanics	3	1-0-0	3
6	E112A	Engineering Graphics	2	0-0-4	4
7	E1101	Engineering Physics Lab	0	0-3-0	2
8	E1102	Computer Programming in C Lab	0	0-3-0	2
9	E110F	*Professional Ethics	2	0-0-0	0
		Total	**20**	**3-6-4**	**24**

I B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E120D	Applied Physics	3	0-0-0	3
2	E120G	Engineering Chemistry	4	0-0-0	4
3	E120C	Mathematics-III	4	1-0-0	4
4	E120H	Professional Communication in English	3	0-0-0	3
5	E122A	Basic Electrical & Electronics Engineering	4	0-0-0	4
6	E1201	Engineering Chemistry Lab	0	0-3-0	2
7	E1204	English Language Communication Skills Lab	0	0-3-0	2
8	E1205	Engineering Workshop	0	0-3-0	2
9	E120E	*Environmental Studies	2	0-0-0	0
		Total	**20**	**1-9-0**	**24**

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CIVIL ENGINEERING
COURSE STRUCTURE – R16

II B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E210A	Numerical Techniques And Transforms	3	1-0-0	3
2	E211A	Strength of Materials – I	4	1-0-0	4
3	E211B	Surveying	4	0-0-0	4
4	E211C	Fluid Mechanics	4	1-0-0	4
5	E211D	Building materials, construction and planning	3	1-0-0	3
6	E2101	Surveying Lab	0	0-3-0	2
7	E2102	Strength of Materials Lab	0	0-3-0	2
8	E2103	CAD Lab-I	0	0-3-0	2
		Total	**18**	**4-9-0**	**24**

II B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E221A	Environmental Engineering	3	1-0-0	3
2	E221B	Strength of Materials – II	4	1-0-0	4
3	E221C	Hydraulics & Hydraulic Machinery	4	0-0-0	4
4	E221D	Engineering Geology	3	0-0-0	3
5	E221E	Structural Analysis	4	1-0-0	4
6	E2201	Engineering Geology Lab	0	0-3-0	2
7	E2202	Environmental Engineering Lab	0	0-3-0	2
8	E2203	Fluid Mechanics and Hydraulic machinery lab	0	0-3-0	2
9	E2204	*Gender Sensitization	0	0-0-0	0
		Total	**18**	**3-9-0**	**24**

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III B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E310A	Management science for engineers	4	0-0-0	4
2	E311A	Design of Reinforced Concrete Structures	4	1-0-0	4
3	E311B	Geotechnical Engineering – I	4	1-0-0	4
4	E311C	Water Resources Engineering - I	4	1-0-0	4
5		OPEN ELECTIVE – I	3	0-0-0	3
6	E3101	Surveying Lab – II	0	0-3-0	2
7	E3102	Geotechnical Engineering Lab	0	0-3-0	2
8	E3103	Employability skills	0	0-2-0	1
		Total	**19**	**3-8-0**	**24**

III B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E321A	Design of Steel Structures	4	1-0-0	4
2	E221B	Transportation Engineering	3	1-0-0	3
3		OPEN ELECTIVE – II	3	0-0-0	3
4		PROFESSIONAL ELECTIVE – I	4	0-0-0	4
5		PROFESSIONAL ELECTIVE – II	4	0-0-0	4
6	E3201	Transportation Engineering Lab	0	0-3-0	2
7	E3202	Concrete Technology La	0	0-3-0	2
8	E3203	Computer aided drafting lab-II	0	0-3-0	2
		Total	**18**	**3-9-0**	**24**

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CIVIL ENGINEERING
COURSE STRUCTURE – R16

IV B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1		PROFESSIONAL ELECTIVE – III	4	1-0-0	4
2		PROFESSIONAL ELECTIVE – IV	4	0-0-0	4
3		PROFESSIONAL ELECTIVE – V	4	1-0-0	4
4	E411A	Estimating and costing	4	1-0-0	4
5	E411B	Prestressed Concrete	4	0-0-0	4
6	E4101	Computer Aided Design & Drafting Lab – II	0	0-3-0	2
7	E4102	Industry oriented mini project	0	0-4-0	2
		Total	**20**	**3-7-0**	**24**

IV B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1		OPEN ELECTIVE – III	3	0-0-0	3
2	E421A	Remote Sensing & GIS	4	1-0-0	4
3	E4201	Remote Sensing & GIS Lab	0	0-3-0	2
4	E4202	Seminar	0	0-6-0	1
5	E4203	Major Project	0	0-15-0	14
		Total	**7**	**1-24-0**	**24**

Note: All End Examinations (Theory and Practical) are of three hours duration.

L – Lecture, T – Tutorial, P – Practical, D – Drawing, C – Credits.

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CIVIL ENGINEERING

PROFESSIONAL ELECTIVE SUBJECTS

Professional Elective – I

Sl. No.	Code	Subject	L	T-P-D	C
1	E321C	Concrete Technology	4	0-0-0	4
2	E321D	Air Pollution and Control	4	0-0-0	4
3	E321E	Ground Water Development & Management	4	0-0-0	4
4	E321F	Watershed Management	4	0-0-0	4

Professional Elective – II

Sl. No.	Code	Subject	L	T-P-D	C
1	E321G	Geotechnical Engineering – II	4	0-0-0	4
2	E321H	Urban Disaster Intelligent control system	4	0-0-0	4
3	E321I	Solid Waste Management	4	0-0-0	4
4	E321J	FEM for Civil Engineering	4	0-0-0	4

Professional Elective – III

Sl. No.	Code	Subject	L	T-P-D	C
1	E411C	Advanced Foundation Engineering	4	0-0-0	4
2	E411D	Traffic Engineering	4	0-0-0	4
3	E411E	Bridge Engineering	4	0-0-0	4
4	E411F	Water Resources Engineering – II	4	0-0-0	4

Professional Elective – IV

Sl. No.	Code	Subject	L	T-P-D	C
1	E411G	Earth & Rock fill Dams & Slope Stability	4	0-0-0	4
2	E411H	Soil Dynamics and Machine Foundations	4	0-0-0	4
3	E411I	Pavement Design	4	0-0-0	4
4	E411J	Construction Technology and project Management	4	0-0-0	4

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CIVIL ENGINEERING

PROFESSIONAL ELECTIVE SUBJECTS

Professional Elective – V

Sl. No.	Code	Subject	L	T-P-D	C
1	E411K	Elements of Earthquake Engineering	4	0-0-0	4
2	E411L	Rehabilitation and Retrofitting of structures	4	0-0-0	4
3	E411M	Design and Drawing of Irrigation Structures	4	0-0-0	4
4	E411N	Ground Improvement Techniques	4	0-0-0	4

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COURSE STRUCTURE – R16

List of Subjects offered by various Board of Studies

Open Elective – I

S. No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	E31OC	Disaster Management	Civil Engineering
2	E31OD	Elements of Civil Engineering	Civil Engineering
3	E31OE	Network Analysis and Synthesis	Electrical and Electronics Engineering
4	E31OF	Measurements and Instruments	Electrical and Electronics Engineering
5	E31OG	Automobile Engineering	Mechanical Engineering
6	E31OI	Engineering Materials and Fabrication Processes	Mechanical Engineering
7	E31OJ	Principles of Electronic Communications	Electronics and Communication Engineering
8	E31OK	Matlab Programming	Electronics and Communication Engineering
9	E31OL	Data Structures through C	Computer Science and Engineering
10	E31OM	Python Programming	Computer Science and Engineering
11	E31ON	E-Disaster Management	Information Technology
12	E31OO	Human Computer Interaction	Information Technology
13	E31OP	Introduction to Microprocessors and Microcontrollers	Electronics and Computer Engineering
14	E31OQ	Internet of Things	Electronics and Computer Engineering

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COURSE STRUCTURE – R16

List of Subjects offered by various Board of Studies

Open Elective – II

S. No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	E32OA	Estimation, Quantity Survey & Valuation	Civil Engineering
2	E32OB	Waste Management	Civil Engineering
3	E32OC	Non-Conventional Energy Sources and Applications	Electrical and Electronics Engineering
4	E32OD	Electrical Technology	Electrical and Electronics Engineering
5	E32OE	Operation Research	Mechanical Engineering
6	E32OG	Nanotechnology	Mechanical Engineering
7	E32OH	Applications of Micro Processors and Controllers	Electronics and Communication Engineering
8	E32OI	Fundamentals of HDL	Electronics and Communication Engineering
9	E32OJ	Database Management Systems	Computer Science Engineering
10	E32OK	Cloud Computing	Computer Science Engineering
11	E32OL	E-Waste Management	Information Technology
12	E32OM	Introduction to Web Design	Information Technology
13	E32ON	Introduction to Embedded systems	Electronics and Computer Engineering
14	E32OO	Fundamentals of E-Commerce	Electronics and Computer Engineering

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COURSE STRUCTURE – R16

List of Subjects offered by various Board of Studies

Open Elective – III

S. No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	E42OA	Environmental Impact Assessment	Civil Engineering
2	E42OB	Green Building Technology	Civil Engineering
3	E42OC	Materials in Electrical Systems	Electrical and Electronics Engineering
4	E42OD	Field Theory and Circuits	Electrical and Electronics Engineering
5	E42OE	Reliability Engineering	Mechanical Engineering
6	E42OG	Special Manufacturing Processes	Mechanical Engineering
7	E42OH	Principles of Computer Communication and Networks	Electronics and Communication Engineering
8	E42OI	Speech Processing	Electronics and Communication Engineering
9	E42OJ	Soft Computing	Computer Science Engineering
10	E42OK	E-commerce	Computer Science Engineering
11	E42OL	Internet of Things	Information Technology
12	E42OM	Semantic Web and Social Networks	Information Technology
13	E42ON	Fundamentals of Intelligence Systems	Electronics and Computer Engineering
14	E42OO	Introduction to Neural Networks	Electronics and Computer Engineering

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B.Tech.: CE	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**1-0-0**	**3**

(E110A) MATHEMATICS – I

(Common to CE,EEE,ME,ECE,CSE,IT,ECM & MIE)

Course Objectives :

The student will

1. understand the methods of solving the linear differential equations of first and higher order and applications of the differential equations
2. recognize the types of matrices and their properties and the concept of rank of a matrix and applying the same to understand the consistency
3. learn how to solve the linear systems and the concepts of eigen values and eigen vectors and reducing the quadratic forms into their canonical forms
4. equipped with the concept of total derivative and finding maxima and minima of functions of two variables
5. formation of the partial differential equations and solving the first order equations

UNIT–I: Initial Value Problems and Applications

Exact differential equations - Reducible to exact.

Linear differential equations of higher order with constant coefficients: Non homogeneous terms with RHS term of the type e^{ax} , sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x)- Operator form of the differential equation, finding particular integral using inverse operator, Wronskian of functions, method of variation of parameters.

Applications: Newton's law of cooling, law of natural growth and decay, orthogonal trajectories, Electrical circuits.

UNIT–II: Linear Systems of Equations

Types of real matrices and complex matrices, rank, echelon form, normal form, consistency and solution of linear systems (homogeneous and Non-homogeneous) - Gauss elimination, Gauss Jordon and LU decomposition methods- Applications: Finding current in the electrical circuits.

UNIT–III: Eigen values, Eigen Vectors and Quadratic Forms

Eigen values, Eigen vectors and their properties, Cayley - Hamilton theorem (without proof), Inverse and powers of a matrix using Cayley - Hamilton theorem, Diagonalization, Quadratic forms, Reduction of Quadratic forms into their canonical form, rank and nature of the Quadratic forms – Index and signature.

UNIT–IV:Partial Differentiation

Introduction of partial differentiation, homogeneous function, Euler's theorem, total derivative, Chain rule, Taylor's and Mclaurin's series expansion of functions of two variables, functional dependence, Jacobian.

Applications: maxima and minima of functions of two variables without constraints and Lagrange's method (with constraints)

UNIT-V:

First Order Partial Differential Equations

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions, Lagranges method to solve the first order linear equations and the standard type methods to solve the non linear equations.

TEXT BOOKS:

1. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers.
2. A first course in differential equations with modeling applications by Dennis G. Zill, Cengage Learning publishers

REFERENCES:

1. Advanced Engineering Mathematics by E. Kreyszig, John Wiley and Sons Publisher.
2. Engineering Mathematics by N. P. Bali, Lakshmi Publications.

Course Outcomes:

The student will be able to

1. Solve higher order DE's and apply them for solving some real world problems
2. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations
3. Analyze the Eigen values and Eigen vectors which come across under linear transformations
4. Examine the values of functions of two variables with/ without constraints.
5. Solve linear partial differential equations of first order.

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B.Tech. CE	**L**	**T-P-D**	**C**
I Year - I Semester	**4**	**1-0-0**	**4**

(E110B) MATHEMATICS – II

(Common to CE,ME&MIE)

Course Objectives:

The Student will:

1. understand the concepts & properties of Laplace transforms and solving differential equations using Laplace transform techniques.
2. examine the evaluation of integrals using beta and gamma functions.
3. describe multiple integrals and applying them to compute the volume and areas of regions and the physical quantities involved in engineering field related to the vector valued functions.
4. evaluate the basic properties of vector valued functions and their applications.
5. describe the Vector integral theorems on line, surface and volume integrals

UNIT–I: Laplace Transforms

Laplace transforms of standard functions, Shifting theorems, derivatives and integrals, properties- Unit step function, Dirac's delta function, Periodic function, Inverse Laplace transforms, Convolution theorem (without proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

UNIT-II: Beta and Gamma Functions

Beta and Gamma functions, properties, relation between Beta and Gamma functions, evaluation of integrals using Beta and Gamma functions.

Applications: Evaluation of integrals.

UNIT–III: Multiple Integrals

Double and triple integrals, Change of variables, Change of order of integration.

Applications: Finding areas, volumes& Center of gravity (evaluation using Beta and Gamma functions).

UNIT–IV: Vector Differentiation

Scalar and vector point functions, Gradient, Divergence, Curl and their physical and geometrical interpretation, Laplacian operator, Vector identities.

UNIT–V: Vector Integration Line Integral, Work done, Potential function, area, surface and volume integrals, Vector integral theorems: Greens, Stokes and Gauss divergence theorems (without proof) and related problems.

TEXT BOOKS:

1. Advanced Engineering Mathematics by R K Jain & S R K Iyengar, Narosa Publishers.
2. Engineering Mathematics by Srimanthapal and Subodh C. Bhunia, Oxford Publishers.

REFERENCES:

1. Advanced Engineering Mathematics by Peter V. O. Neil, Cengage Learning Publishers.
2. Advanced Engineering Mathematics by Lawrence Turyn, CRC Press

Course Outcomes:

The student will be able to:

1. Use laplace transform techniques for solving de's.
2. Evaluate integrals using beta and gamma functions.
3. Evaluate the multiple integrals and can apply these concepts to find areas, volumes, moment of inertia etc of regions on a plane or in space.
4. Calculate the unit tangent vector, the unit normal vector and the unit binormal vector at a point on a space curve described by a vector-valued position function.
5. Analyze the line, surface and volume integrals and converting them from one to another

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B.Tech. CE	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**0-0-0**	**3**

(E110C) ENGINEERING PHYSICS

(Common to CE,ME&MIE)

Course Objectives:

The Student will

1. The understand interaction of light with matter through interference, diffraction and polarization.
2. The Distinguish between ordinary light with a laser light and to realize propagation of light through optical fibers.
3. Various crystal systems and there structures elaborately.
4. Various crystal imperfections and probing methods like X-RD.
5. The concepts of latest developments in fiber optics

UNIT-I : Interference

Coherence, division of amplitude and division of wave front, interference in thinfilms (transmitted and reflected light), Newton's rings experiment.

Diffraction: Distinction between Fresnel and Fraunhoffer diffraction, diffraction due to singleslit, N-slits, Diffraction grating experiment.

UNIT-II : Polarization

Introduction, Malus's law, double refraction, Nicol prism, Quarter wave and halfwave plates.

Lasers: Characteristics of lasers, spontaneous and stimulated emission of radiation, Einstein coefficients, population inversion, ruby laser, helium – neon laser, semi conductor laser, applications of lasers.

UNIT-III: Fiber Optics

Principle of optical fiber, construction of fiber, acceptance angle and acceptance cone, numerical aperture, types of optical fibers: step index and graded index fibers, attenuation in optical fibers, applications of optical fibers in medicine and sensors**.**

UNIT-IV: Crystallography

Space lattice, unit cell and lattice parameters, crystal systems, Bravaislattices, atomic radius, co-ordination number and packing factor of SC, BCC, FCC, HCP and diamond, Miller indices, crystal planes and directions, inter planar spacing of orthogonal crystal systems.

UNIT-V: X-ray Diffraction and Defects in Crystals

Bragg's law, X-ray diffraction methods: Lauemethod, powder method; point defects: vacancies, substitutional, interstitial, Frenkel and Schottky defects, line defects (qualitative) and Burger's vector, surface defects: stacking faults, twin, tilt and grain boundaries.

TEXT BOOKS:

1. Applied Physics – P.K.Mittal (I.K.Internationalhosesepvt Ltd) (New Edition)
2. Enginnering Physics-P.K Palaniswamy (Scitech Publications India) Pvt Ltd, Fifth Print 2010.
3. Engineering Physics-Senthilkumar ((VRB Publishers Limited,)

REFERENCES:

1. Applied Physics for Engineers – A.J. Dekker (Macmillan).
2. Elements of Material Science – V.Raghavant (PHI Publications).
3. Solid State Physics – M. Armugam (Anuradha Publications).
4. A Text Book of Engg Physics – M. N. Avadhanulu& P. G. Khsirsagar– S. Chand & Co.
5. Modern Physics by K. Vijaya Kumar, S. Chandralingam: S. Chand &Co.Ltd

Course outcomes:

The student will be able to:

1. Identify concept of refelction and refraction rules of light in differnet medium
2. Identify characteristics of laser, working of various laser systems and light propagation through optical fibers.
3. Describe principles of fiber optics ,different types of fiber optics and its applications .
4. Distinguish between various crystal systems
5. Identify the crystal defects by using X-RD

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
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B.Tech. CE	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**0-0-0**	**3**

(E110D) COMPUTER PROGRAMMING IN C

(Common to CE, ME & MIE)

Course Objectives:

The student will:

1. understand the fundamentals of computers.
2. reads the fundamentals of c programming such as variables, constants, basic data types, selection statements, repetition statements etc.
3. studies the need for user-defined functions and understand the concept of arrays and its memory organization
4. reads the significance of pointers and describe about various character and string functions.
5. understand the concept of structures and unions.

UNIT - I:

Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Program Development, algorithms and flowcharts , Number systems-Binary, Decimal, Hexadecimal and Conversions, storing integers and real numbers.

Introduction to C Language – Background, C Programs, Identifiers, Types, Variables, Constants, Input / Output, Operators(Arithmetic, relational, logical, bitwise etc.), Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Statements- Selection Statements(making decisions) – if and switch statements, Repetition statements (loops)-while, for, do-while statements, Loop examples, other statements related to looping – break, continue, goto, Simple C Program examples.

UNIT - II:

Functions-Designing Structured Programs, Functions, user defined functions, inter function communication, Standard functions, Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion- recursive functions, Limitations of recursion, example C programs.

Arrays – Concepts, using arrays in C, inter function communication, array applications-linear search, binary search and bubble sort, two – dimensional arrays, multidimensional arrays, C program examples.

UNIT - III:

Pointers – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, Pointer Applications-Arrays and Pointers, Pointer Arithmetic and arrays, Passing an array to a function, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions.

Strings – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C program examples.

UNIT - IV:

Enumerated, Structure ,and Union Types– The Type Definition (typedef), Enumerated types, Structures –Declaration, initialization, accessing structures, operations on structures, Complex structures-Nested structures, structures containing arrays, structures containing pointers, arrays of structures, structures and functions, Passing structures through pointers, self referential structures, unions, bit fields, C programming examples, command–line arguments, Preprocessor commands.

UNIT – V:

Input and Output – Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), file status functions (error handling), Positioning functions (fseek ,rewind and ftell), C program examples.

TEXT BOOKS:

1. Computer Science: A Structured Programming Approach Using C, B.A. Forouzan and R. F. Gilberg, Third Edition, Cengage Learning.
2. Programming in C. P. Dey and M Ghosh , Second Edition, Oxford University Press.

REFERENCES:

1. The C Programming Language, B.W. Kernighan and Dennis M. Ritchie, Second Edition, Pearson education.
2. Programming with C, B. Gottfried, 3rd edition, Schaum's outlines, McGraw Hill Education(India) Pvt Ltd.
3. C From Theory to Practice, G S. Tselikis and N D. Tselikas, CRC Press.

Course Outcomes:

The student will be able to:

1. Write, compile and debug programs using different programming constructs in C language.
2. Design programs using modular structures
3. Apply and practice logical ability to solve the problems using C
4. Design and present the algorithms flow charts and programs
5. Apply operations like searching, insertion, deletion, traversing mechanism etc. on various data structures

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B.Tech. CE	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**1-0-0**	**3**

(E113A) ENGINEERING MECHANICS

(Common to CE,EEE,ME,ECE,CSE,IT,ECM&MIE)

Course Objectives:

The student will

1. reads the concept of system of forces and its applications.
2. determine the centroid and centre of Gravity of different structures
3. understand the concept of inertia and its real time applications
4. analyze the bodies in motion
5. analyze the bodies in motion by considering the force cause the motion

UNIT–I: Introduction to Engineering Mechanics

Basic Concepts. Systems of Forces: Coplanar Concurrent Forces–Forces in Space–Moment of Force and its Application–Couples and Resultant of Force Systems.

Equilibrium of Force Systems: Free Body Diagrams, Equations of Equilibrium - Equilibrium of planar Systems -Equilibrium of Spatial Systems.

UNIT–II: Centroid : Centroids of simple figures (from basic principles)–Centroids of Composite Figures

Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorem.

UNIT–III: Area moment of Inertia

Definition–Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.

UNIT–IV: Kinematics

Rectilinear and Curvilinear motions–Velocity and Acceleration–Motion of Rigid Body Types and their Analysis in Planar Motion.

UNIT–V: **Kinetics:** Analysis as a Particle and Analysis as a Rigid Body in Translation–Central Force Motion Equations of Plane Motion–Fixed Axis Rotation–Rolling Bodies.

TEXT BOOKS:

1. Engineering Mechanics / Timoshenko & Young.
2. Engineering Mechanics, Basudev Bhattacharya, Oxford Univ. Press, New Delhi, Second Edition, 2014.
3. Engineering Mechanics / Fedinand . L. Singer / Harper–Collins

REFERENCES:

1. Engineering Mechanics / S.S. Bhavikatti& J.G. Rajasekharappa
2. 2.Engineering Mechanics / Irving. H. Shames Prentice–Hall.
3. 3.Engineering Mechanics UmeshRegl / Tayal.
4. Engineering Mechanics-Basic Concepts, Y.V.D.Rao, M.Manzoor Hussain, K.GovindaRajulu, Academic Publishing Company

Course outcomes:

The student will be able to

1. Recognize the resultant of a force system acting on an object.
2. Identify the surface area of complex objects.
3. Relate with application of different theorems of moment of inertia.
4. Identify the kinematics involved in a moving object.
5. Analyze the bodies in motion

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B.Tech. CE	**L**	**T-P-D**	**C**
I Year -I Semester	**2**	**0-0-4**	**4**

(E112A) ENGINEERING GRAPHICS
(Common to ME, CE & MIE)

Course objectives:
The student will

1. get the basic knowledge of conventions used in engineering graphics, constructing engineering scales and various methods to construct various engineering curves.
2. identify the different angles of projections, conventions and the position of objects in various planes.
3. understand the different orientations of two dimensional planes and right regular solids at different inclinations with respect to projection planes able to identify the internal features of object.
4. define the size and shape of required sheet to form a right regular solid.
5. learn to solve the typical problems from 3-Dimensional view to simplified 2-Dimensional view and vice versa.

UNIT – I : INTRODUCTION TO ENGINEERING DRAWING:
Principles of Engineering Drawing and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions.
SCALES: Different types of Scales, Plain scales, Vernier Scale, Digonal Scale, Scales of chords.
CONSTRUCTION OF CURVES USED IN ENGINEERING PRACTICE:

a) Conic Sections ; Ellipse-General, Concxentric Circle, Arcs of circle and Oblong Method, Parabola- General, Tangent and Rectangle Methods, Hyperabola-General, Point/Rectangle Method
b) Cycloid, Epicycloid and Hypocycloid
c) Involute for Circle, Rectangle and Triangle

UNIT – II :
PROJECTIONS OF POINTS AND LINES
Principles of Orthographic Projections – Conventions – First and Third Angle, Projections of Points and Lines inclined to planes, True lengths, Traces.

UNIT – III :
PROJECTIONS OF PLANES
Projections of regular Planes, auxiliary planes and Auxiliary projection inclined to both planes.
PROJECTIONS OF SOLIDS: Projections of Regular Solids inclined to both planes, Section of right regular solids,-Prism, Cylinder, Pyramid and Cone.

UNIT – IV:

DEVELOPMENT OF SURFACES

Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid Cone.

UNIT – V:

ISOMETRIC PROJECTIONS

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

ORTHOGRAPHIC PROJECTIONS: Conversion of Isometric Views to Orthographic Views – Conventions.

TEXT BOOKS :

1. Engineering Drawing, N.D. Bhat / Charotar
2. Engineering Drawing and Graphics, Venugopal / New age.
3. Engineering Drawing – Basant Agrawal, TMH

REFERENCES:

1. Engineering drawing – P.J. Shah.S.Chand.
2. Engineering Drawing, Narayana and Kannaiah / Scitech publishers.
3. Engineering Drawing- Johle/Tata Macgraw Hill.
4. Computer Aided Engineering Drawing- Trymbaka Murthy- I.K. International.

Course Outcomes:

The student will be able to

1. construct various scales and can draw the objects of various sizes in a prescribe given size of sheet. And able obtain various curves used in engineering design.
2. obtain the projections of point and line in different positions and different inclinations respectively. Construct Traces of lines.
3. obtain the projections of plane and solid with different positions of surfaces edges and axis with respect to reference planes.
4. draw the sectional views to view inside features of right regular syllabus.
5. identify the objects of complicated shape and to draw the same in 2-Dimensional view. Can draw 3-Diemensional views and isometric projections by observing front view and top view (2-Dimensional views).

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B.Tech. CE	**L**	**T-P-D**	**C**
I Year - I Semester	**0**	**0-3-0**	**2**

(E1101) ENGINEERING PHYSICS LAB

(Common to CE,ME & MIE)

Course Objective:

The student will:

1. works with uses of torsional pendulum
2. examine energy gap of semiconductors
3. analyze the behavior and characteristics of various materials for its optimum utilization.
4. practice about the various electronic communication mechanisms and their usage in a practical manner.
5. demonstrate the ability to prepare a valid laboratory notebook.

Experiments:

1. Dispersive power of the material of a prism – Spectrometer.
2. Torsional pendulum – Rigidity modulus.
3. Newton's Rings – Radius of curvature of Plano convex lens.
4. Melde's experiment – Transverse and longitudinal modes.
5. Charging, discharging and time constant of an R-C circuit.
6. L-C-R circuit – Resonance & Q-factor.
7. Magnetic field along the axis of current carrying coil – Stewart and Gees method and to verify Biot – Savart's law.
8. Study the characteristics of LED and LASER diode.
9. Bending losses of fibres& Evaluation of numerical aperture of a given fibre.
10. Energy gap of a material of p-n junction.
11. Determination of wavelengths of white source – Diffraction grating.
12. Wavelength of light, resolving power and dispersive power of a diffraction grating using laser.
13. Dielectric constant of a material / V-I characteristics of a solar cell.

Course Outcomes:

The student will be able to:

1. Identify basic physical concepts and vacubulary used to describe them elasticity by using Torsional Pendulum
2. Apply the various procedures and techniques for the measurement of resonence frequency in LCR circuit.
3. Analyze working principle of laser and to summarise it's aplications.
4. Explore the working principle of semiconductor diode
5. Identify the real time application of electromagnetic theory by stewart and gee's method.

Note: Minimum 10 experiments must be performed.

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B.Tech. CE	L	T-P-D	C
I Year - I Semester	0	0-3-0	2

(E1102) COMPUTER PROGRAMMING IN C LAB

(Common to CE, ME & MIE)

Course Objective:

The student will :

1. implement linked list, stack , queue, tree
2. develop programming skills using the fundamentals and basics of C language
3. change character strings in C programs.
4. use pointers to efficiently solve problems
5. memorize functions from the portable C library and to describe the techniques for creating program modules using functions and recursive functions.

Recommended Systems/Software Requirements:

- Intel based desktop PC
- GNU C Compiler

1. **a)** Write a C program to find the factorial of a positive integer.
   b) Write a C program to find the roots of a quadratic equation.
2. **a)** Write a C program to determine if the given number is a prime number or not.
   b)A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first nterms of the sequence.
3. **a)** Write a C program to construct a pyramid of numbers.
   b) Write a C program to calculate the following Sum: Sum=1-x2/2! +x4/4!-x6/6!+x8/8!-x10/10!
4. **a)** The least common multiple (lcm) of two positive integers a and b is the smallest integer that is evenly divisible by both a and b. Write a C program that reads two integers and calls lcm (a, b) function that takes two integer arguments and returns their lcm. The lcm (a, b) function should calculate the least common multiple by calling the gcd (a, b) function and using the following relation:CM (a,b) = ab / gcd (a,b)
   b) Write a C program that reads two integers n and r to compute the ncr value using the following relation: ncr (n,r) = n! / r! (n-r)! . Use a function for computing the factorial value of an integer.
5. **a)** Write C program that reads two integers x and n and calls a recursive function to compute xn
   b) Write a C program that uses a recursive function to solve the Towers of Hanoi problem.

   c) Write a C program that reads two integers and calls a recursive function to

compute ncr value.

6. **a)** Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user using Sieve of Eratosthenes algorithm.

   b) Write a C program that uses non recursive function to search for a Key value in a given list of integers. Use linear search method.

7. a) Write a menu-driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.

   b) Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers. Use binary search method.

8. **a)** Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.

   b) Write a C program that reads two matrices and uses functions to perform the following:

   i) Addition of two matrices
   ii) Multiplication of two matrices

9. **a)** Write a C program that uses functions to perform the following operations:

   i) to insert a sub-string into a given main string from a given position.
   ii) to delete n characters from a given position in a given string.

   b) Write a C program that uses a non recursive function to determine if the given string is a Palindrome or not.

10. **a)** Write a C program to replace a substring with another in a given line of text.

    b) Write a C program that reads 15 names each of up to 30 characters, stores them in an array, and uses an array of pointers to display them in ascending (ie. alphabetical) order.

11. **a)** 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.

    b) Write a C program to convert a positive integer to a roman numeral. Ex. 11 is converted to XI.

12. **a)** Write a C program to display the contents of a file to standard output device.

    b) Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.

13. **a)** Writ**e a C** program to count the number of times a character occurs in a text file. The file name and the character are supplied as command-line arguments.

    b) Write a C program to compare two files, printing the first line where they differ.

14. **a)** Write a C program to change the nth character (byte) in a text file. Use fseek function.

    b) Write a C program to reverse the first n characters in a file. The file name and n are specified on the command line. Use fseek function.

15. **a)** Write a C program to merge two files into a third file (i.e., the contents of the firs t file followed by those of the second are put in the third file).

    b) Define a macro that finds the maximum of two numbers. Write a C program that uses the macro and prints the maximum of two numbers.

REFERENCES:

1. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.
2. Computer Programming in C, V. Rajaraman, PHI.
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. C++: The complete reference, H. Schildt, TMH Publishers.

Course Outcomes

The student will be able to:

1. Write, compile and debug programs using different programming constructs in C language.
2. Design programs using modular structures
3. Apply and practice logical ability to solve the problems using C
4. Design and present the algorithms flow charts and programs
5. Apply operations like searching, insertion, deletion, traversing mechanism etc. on various data structures

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B.Tech. CE	**L**	**T-P-D**	**C**
I Year – I Semester	**2**	**0-0-0**	**0**

(E110F) PROFESSIONAL ETHICS

(Common to CE,EEE,ECE & ECM)

Course Objectives:

The student will :

1. learn ethical values and attitudes.
2. understand the roles of a professional.
3. understand the current scenario and engineers responsibility towards the society
4. know the types of professional ethical codes.
5. learn the need for ethical audit.

UNIT - I:Basic Concepts

Introduction, Ethics-Ethical Dilemma-Morals, , emotional, intelligence, Indian and western thoughts on ethics, value education, domains of learning, human values, attitudes, Basic Ethical Principles. Meaning of profession, professionalism, professional's roles and professional risks, professional accountability, successful professional, engineering professionals, engineering ethics, roles of engineers.

UNIT - II: Global issues and safety

Introduction, current scenario, business ethics, environmental ethics, computer ethics, ethical hacking and its dilemma,, ethics in research, intellectual property rights, patents, trademarks, managers and engineers responsibility , Engineering ethics.

UNIT - III: Ethical codes and audits

Introduction need and types of professional ethical codes, sample standard codes, ethical codes for corporate entities and non-profit organization, charitable institutions, limitations of the codes, need for ethical audit, ethical profile of organizations.

REFERENCES:

1. Professional ethics and human value by D.R.Kiran, Tata McGraw Hills education.
2. Ethics in engineering by Mike W. Martin and Roland Schinzinger, Tata McGraw Hills education.
3. Fundamental of Ethics by Edmund G Seebauer and Robert L.Barry, Oxford university press.
4. Professional ethics and human values by R.S.Nagarajan, New age international.
5. Professional ethics by R. Subramanian, Oxford press.

Course Outcomes:

The student will be able to:

1. Use of ethical values and attitudes in their life.
2. Implement once he/she becomes a professional.
3. Solve the issues related with environment and technology
4. Apply the different types of professional ethical codes in their organization.
5. Use of the rules framed by the auditors.

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B.Tech. CE	**L**	**T-P-D**	**C**
I Year - II Semester	**3**	**0-0-0**	**3**

(E120D) APPLIED PHYSICS

(Common to ME,CE & MIE)

Course Objectives:

The student will

1. To understand magnetic, dielectric and superconducting properties
2. To understand the elastic behavior of materials.
3. To understand basic principles of acoustics and architecture of buildings.
4. To understand magnetic, dielectric and superconducting properties.
5. To study different materials and differentiate the properties**.**

UNIT - I: Elastic properties

stress and strain, Hooke's law, elastic behavior of a material, factors affecting elasticity, three modulii of elasticity, work done for unit volume in deforming a body, elation between three modulii of elasticity, determination of rigidity modulus – torsional pendulum.

UNIT - II

Acoustics of buildings and acoustic quieting: Introduction, basic requirement for the acoustically good halls, reverberation and time of reverberation, transmission of sound and transmission loss, factors affecting the architectural acoustics and their remedy, sound absorbing materials, sabine formulae, absorption coefficients, stadium seating, movie theater, acoustic quieting.

UNIT - III: Ultrasonics

Introduction, production of ultrasonic waves, magnetostriction method, piezoelectric method, detection of ultrasonic waves, properties of ultrasonic waves, use of ultrasonics for nondestructive testing, applications of ultrasonics.

UNIT - IV: Dielectric Properties

Electric dipole, dipole moment, dielectric constant, polarizability, electric susceptibility, displacement vector, electronic, ionic and orientation polarizations and calculation of their polarizabilitites, internal field, Clausius-Mossotti relation, Piezoelectricity, pyroelectricity and ferroelectricity-$BaTiO_3$ structure.

UNIT - V: Magnetic Properties

Permeability, field intensity, magnetic field induction, magnetization,
magnetic susceptibility, origin of magnetic moment, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, hysteresis curve based on domain theory, soft and hard magnetic materials, properties of anti-ferro and ferri magnetic materials.

Superconductivity: Superconductivity phenomenon, Meissner effect, applications of superconductivity.

TEXT BOOKS:

1. Solid State Physics, A. J. Dekkar, MacMillan publishers
2. Fundamentals of Physics, Alan Giambattisa, BM Richardson and Robert C Richardson,Tata McGraw hill Publishers
3. Fundamentals of Acoustics, Kinster and Frey, John Wiley and Sons.

REFERENCES:

1. Solid state physics, Charles Kittel, Wiley student edition
2. University Physics, Francis W. Sears, Hugh D. Young, MarleZeemansky and Roger AFreedman, Pearson Education.
3. Introduction to Magnetic Materials, B.D. Cullity, C.D.Graham, A John Wiley & Sons, Inc., Publication.
4. Elastic and Inelastic Stress Analysis, Irving H. Shames, Francis A. Cozzarelli, Taylor, & Francis Group.

Course Outcomes:

The student will be able to

1. Realize the importance of elastic behavior of materials.
2. Learn Sabine's formula for reverberation time and apply in architecture of buildings.
3. Learn various methods of producing ultrasonic's and their uses.
4. Categorize various dielectric properties and apply them in engineering applications.
5. Categorize various magnetic, super conducting properties and apply them in engineering applications.

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B.Tech. CE	**L**	**T-P-D**	**C**
I Year - II Semester	**4**	**0-0-0**	**4**

(E120G) ENGINEERING CHEMISTRY

(Common to CE,ME & MIE)

Course Objectives:

The Student will

1. acquire the skills to critically assess and solve problems related to water requiring the application of chemical principles.
2. be made familiar with research design methodology and to use problem-solving techniques associated with electrochemistry.
3. understand to organize and present chemical information coherently through oral and written discourse based on polymers.
4. learn how be to apply science and engineering in the analysis and evaluation of process involved in production of energy efficient fuels.
5. be equipped with the ability to invent or discover new environmental friendly , energy efficient and economically effective engg materials in a sustainable manner.

UNIT-I: Water and its treatment

Introduction – hardness of water – causes of hardness – types of hardness: temporary and permanent – expression and units of hardness – Estimation of hardness of water by complexometric method. Numerical problems. Potable water and its specifications- Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and Ozonization. Defluoridation – Nalgonda technique - Determination of F^- ion by ion-selective electrode method.

Boiler troubles: Sludges, scales and Caustic embrittlement. Internal treatment of Boiler feed water (Calgon conditioning – Phosphate conditioning - Colloidal conditioning) .Softening of water by ion-exchange processes. Desalination of water – Electrodialysis& Reverse osmosis. Numerical problems.

UNIT-II:Electrochemistry and Batteries

Electrochemistry: Electrode- electrode potential, standard electrode potential, types of electrodes – Construction and functioning of Standard hydrogen electrode, calomel, Quinhydrone and glass electrode. Nernst equation - electrochemical series and its applications. Electrochemical cells: Daniel cell – cell notation, cell reaction and cell emf – Potentiometric titrations and Applications- Determination of pH and EMF. Concept of concentration cells-electrolyte concentration cell. Numerical problems.

Batteries: Cell and battery - Primary battery (dry cell, alkaline cell and Lithium cell) and Secondary battery (lead acid, Ni-Cd and lithium ion cell), **Fuel cells:** Hydrogen –oxygen, phosphoric acid and methanol-oxygen fuel cells – Applications.

UNIT-III: Polymers

Definition – Classification of polymers with examples – Types of polymerization –
addition and condensation polymerization with examples. **Plastics:** Definition and characteristics- thermoplastic and thermosetting plastics, compounding and fabrication of plastics (compression and injection moulding). Preparation, Properties and engineering applications of PVC and Bakelite.

Fibers: Characteristics of fibers – preparation, properties and applications of Nylon-6, 6 and Dacron. Kevlar- Liquid crystal polymers-Applications.
Rubbers: Natural rubber and its vulcanization.
Elastomers: Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.
Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT-IV: Fuels and Combustion
Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking – types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG.
Combustion: Definition, Calorific value of fuel – HCV, LCV-Dulongs Formula; Calculation of air quantity required for combustion of a fuel.

UNIT-V: Engineering Materials and applications
Lubricants-Classification of lubricants with examples-characteristics of a good lubricants – mechanism of lubrication-properties of lubricants.
Conducting polymers: Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.
Nanomaterials: Introduction, Preparation-Top down & bottom up process-sol gel method and self assembly process. Applications of nanomaterials.
Composites: Introduction- Constituents of composites – advantages, classification and constituents of composites. Fiber reinforced plastics (FRP). Applications of composites.

TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, New Delhi
2. Engineering Chemistry by Rama Devi, VenkataRamana Reddy and Rath, Cengage learning, New Delhi
3. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi

REFERENCES:

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi
2. Engineering Chemistry by Thirumala Chary and Laxminarayana, Scitech Publishers, Chennai
3. Engineering Chemistry by Andhra Naidu. B.S Publications.
4. Chemistry of Engineering Materials by CV Agarwal,C.P Murthy, A.Naidu, BS Publications.

Course Outcomes:
The student will be able to:

1. Identify the suitability of water for domestic and industrial purposes
2. Apply the basic principle of electro chemistry.
3. Design the new polymeric materials for engineering applications.
4. Develop innovative methods and engineering materials that are useful in every walk of life.
5. Apply new chemical techniques for the production of fuels that are useful in every walk of life.

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B.Tech. CE	**L**	**T-P-D**	**C**
I Year - II Semester	**4**	**1-0-0**	**4**

(E120C) MATHEMATICS – III

(Common to CE,EEE,ME, ECE,CSE,IT,ECM& MIE)

Course Objectives:

The Student will

1. understand random variables that describe randomness or an uncertainty in certain realistic situation and binomial geometric and normal distributions
2. formulate sampling distribution of mean, variance, point estimation and interval estimation and the testing of hypothesis and ANOVA
3. describe the topics that deals with methods to find roots of an equation
4. discuss how to fit a desired curve by the method of least squares for the given data
5. identify how to solve ordinary differential equations using numerical techniques

UNIT–I:

Random variables and Distributions

Introduction, Random variables, Discrete random variable, Continuous random variable, Probability ,Distribution function, Probability density function, Expectation, Moment generating function, Moments and properties. Discrete distributions: Binomial and geometric distributions. Continuous distribution: Normal distributions.

UNIT – II:

Sampling Theory

Introduction, Population and samples, Sampling distribution of means (σKnown)-Central limit theorem, t-distribution, Sampling distribution of means (σunknown)-Sampling distribution of variances – $\chi^2$and F- distributions, Point Estimation, Maximum error of estimate, Interval estimation.

UNIT – III:

Tests of Hypothesis

Introduction, Hypothesis, Null and Alternative Hypothesis, Type I andType II errors,
Level of significance, One tail and two-tail tests, Tests concerning one mean and proportion, two means -proportions and their differences-ANOVA for one-way classified data.

UNIT – IV:

Algebraic and Transcendental Equations & Curve Fitting

Introduction, Bisection Method, Method of False position, Iteration methods: fixed point iteration and Newton Raphson methods. Solving linear system of equations by
Gauss-Jacobi and Gauss-Seidal Methods.

Curve Fitting: Fitting a linear, second degree, exponential, power curve by method of least squares.

UNIT – V:

Numerical Integration and solution of Ordinary Differential equations

Trapezoidal rule-Simpson's 1/3rd and 3/8th rule- Solution of ordinary differential equations by Taylor's series, Picard's method of successive approximations, Euler's method, Runge-Kutta method (second and fourth order)

TEXT BOOKS:

1. Probability and Statistics for Engineers by Richard Arnold Johnson, Irwin Miller and John E. Freund, New Delhi, Prentice Hall.
2. Probability and Statistics for Engineers and Sciences by Jay L. Devore, Cengage Learning.
3. Numerical Methods for Scientific and Engineering Computation by M. K. Jain, S. R.
4. K. Iyengar and R. K. Jain, New Age International Publishers

REFERENCES:

1. Fundamentals of Mathematical Statistics by S. C. Guptha& V. K. Kapoor, S. Chand.
2. Introductory Methods of Numerical Analysis by S. S. Sastry, PHI Learning Pvt. Ltd.
3. Mathematics for engineers and scientists by Alan Jeffrey, 6th edition, CRC press.

Course Outcomes:

The student will be able to:

1. Differentiate among random variables involved in the probability models which are useful for all branches of engineering
2. Evaluate mean, proportions and variances of sampling distributions and to make important decisions for few samples which are taken from a large data
3. Solve the tests of ANOVA for classified data
4. Identify the root of a given equation and solution of a system of equations &design a curve for a given data
5. Derive the numerical solutions for a given first order initial value problems

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B.Tech. CE	**L**	**T-P-D**	**C**
I Year - II Semester	**3**	**0-0-0**	**3**

(E120H) PROFESSIONAL COMMUNICATION IN ENGLISH

(Common to CE, ME & MIE)

Course Objectives:

The student will:

1. understand the speech of Dr.APJ Abdul Kalam
2. know how Satya Nadella succeeded in his life.
3. learn the concept of technical communication.
4. learn how to behave with everyone.
5. know the influence of parents in their life

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic and communicative competencies of Engineering students.

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text book for detailed study. The students should be encouraged to read the texts/poems silently leading to reading comprehension. Reading comprehension passages are given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, from newspaper articles, advertisements, promotional material, etc. *The focus in this syllabus is onskill development, fostering ideas and practice of language skills.*

Reading Skills:

Objectives:

- To develop an awareness in students about the significance of silent reading and comprehension.
- To develop students' ability to guess meanings of words from the context and grasp the overall message of the text, draw inferences, etc., by way of:
- Skimming and Scanning the text
- Intensive and Extensive Reading
- Reading for Pleasure
- Identifying the topic sentence

NOTE: The students will be trained in reading skills using the prescribed texts for detailed study. They will be tested in reading comprehension of different 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.

Writing Skills:

Objectives:

- To develop an awareness in the students about writing as an exact and formal skill
- To create an awareness in students about the components of different forms of writing, beginning with the lower order ones through;
- Writing of sentences
- Use of appropriate vocabulary
- Paragraph writing
- Coherence and cohesiveness
- Narration / description
- Note Making
- Formal and informal letter writing
- Describing graphs using expressions of comparison

In order to improve the proficiency of the students in the acquisition of language skills mentioned above, the following text and course contents, divided into Five Units, are prescribed:

UNIT –I:

Chapter entitled '***Presidential Address' by Dr. A.P.J. Kalam*** from ***"Fluency in English–A Course book for Engineering Students"*** published by Orient BlackSwan, Hyderabad.

Vocabulary: Word Formation -- Root Words --The Use of Prefixes and Suffixes–Collocations– Exercises for Practice.

Grammar: Punctuation – Parts of Speech- Articles -Exercises for Practice.

Reading: ***Double Angels*** by David Scott-Reading and Its Importance- Techniques forEffective Reading- Signal Words- Exercises for Practice

Writing: Writing Sentences- Techniques for Effective Writing-- Paragraph Writing-Types, Structure and Features of a Paragraph-Coherence and Cohesiveness: Logical, Lexical and Grammatical Devices - Exercises for Practice

UNIT –II:

Chapter entitled ***Satya Nadella: Email to Employees on his First Day as CEO*** from ***"Fluencyin English– A Course book for Engineering Students"*** Published by Orient BlackSwan,
Hyderabad.

Vocabulary: Synonyms and Antonyms–Homonyms, Homophones, Homographs-Exercisesfor Practice (Chapter 17 ***'Technical Communication-Principles and Practice'.***

Third Edition published by Oxford University Press may also be followed.)**Grammar:** Verbs-Transitive, Intransitive and Non-finite Verbs–Mood and Tense—Gerund – Words with Appropriate Prepositions – Phrasal Verbs - Exercises for Practice

Reading: Sub-skills of Reading- Skimming, Scanning, Extensive Reading and Intensive Reading - ***The Road Not Taken*** by **Robert Frost** -- Exercises for Practice

Writing: Letter Writing–Format, Styles, Parts, Language to be used in Formal Letters-Letter of Apology – Letter of Complaint-Letter of Inquiry with Reply – Letter of Requisition –- Exercises for Practice

UNIT –III:

From the book entitled ***'Technical Communication-Principles and Practice'. Third Edition*** published by Oxford University Press.

Vocabulary: Introduction- A Brief History of Words–Using the Dictionary and Thesaurus– Changing Words from One Form to Another – Confusables (From Chapter 17 entitled '*Grammar and Vocabulary Development*')

Grammar: Tenses: Present Tense- Past Tense- Future Tense- Active Voice – Passive Voice- Conditional Sentences – Adjective and Degrees of Comparison. (From Chapter 17 entitled '*Grammar and Vocabulary Development*')

Reading: Improving Comprehension Skills – Techniques for Good Comprehension- Skimming and Scanning- Non-verbal Signals – Structure of the Text – Structure of Paragraphs – Punctuation – Author's viewpoint (Inference) – Reader

Anticipation: Determining the Meaning of Words – Summarizing- Typical Reading Comprehension Questions. (From Chapter 10 entitled '*Reading Comprehension*')

Writing: Introduction- Letter Writing-Writing the Cover Letter- Cover Letters Accompanying Resumes- Emails. (From Chapter 15 entitled '*Formal Letters, Memos, and Email'*)

UNIT –IV:

Chapter entitled ***'Good Manners' by J.C. Hill*** from ***Fluency in English–A Course book for Engineering Students"*** published by Orient Blackswan, Hyderabad.

Vocabulary: Idiomatic Expressions–One- word Substitutes --- Exercises for Practice(Chapter 17 ***'Technical Communication-Principles and Practice'. Third Edition*** published by Oxford University Press may also be followed.)**Grammar:** Sequence of Tenses- Concord (Subject in Agreement with the Verb)– Exercises for Practice

Reading: ***'If'*** poem by**Rudyard Kipling**--Tips for Writing a Review ---Author'sViewpoint – Reader's Anticipation-- Herein the Students will be required to Read and Submit a Review of a Book (Literary or Non-literary) of their choice – Exercises for Practice.

Writing: Information Transfer-Bar Charts-Flow Charts-Tree Diagrams etc., -- Exercises for Practice.

Introduction - Steps to Effective Precis Writing – Guidelines- Samples (Chapter 12 entitled '*The Art of Condensation*' from ***Technical Communication-Principles and Practice. Third Edition*** published by Oxford University Press)

UNIT –V:

Chapter entitled ***'Father Dear Father'*****by Raj Kinger** from ***Fluency in English–A Coursebook for Engineering Students"*** Published by Orient BlackSwan, Hyderabad

Vocabulary: Foreign Words—Words borrowed from other Languages- Exercises forPractice

Grammar: Direct and Indirect Speech- Question Tags- Exercises for Practice

Reading: Predicting the Content- Understanding the Gist – SQ3R Reading Technique-

Study Skills – Note Making - Understanding Discourse Coherence – Sequencing Sentences. (From Chapter 10 entitled **'Reading Comprehension'-** ***Technical Communication- Principles and Practice. Third Edition*** publishedby Oxford University Press.)

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports –Formats- Prewriting – Structure of Reports (Manuscript Format) - Types of Reports - Writing the Report. (From Chapter 13 entitled **'Technical Reports' -** ***Technical Communication- Principles and Practice. Third Edition***published by Oxford University Press.)

TEXT BOOKS :

1. ***"Fluency in English – A Course book for Engineering Students"*** by Board of Editors**: Hyderabad: Orient BlackSwan Pvt. Ltd. 2016. Print.**
2. Raman, Meenakshi and Sharma, Sangeeta. ***"Technical Communication- Principles andPractice".*** **Third Edition. New Delhi: Oxford University Press. 2015. Print.**

REFERENCES :

1. Green, David. *Contemporary English Grammar–Structures and Composition.* MacMillan India. 2014 (Print)
2. Rizvi, M. Ashraf. *Effective Technical Communication*. Tata Mc Graw –Hill. 2015 (Print).

Course Outcomes:

The student will be able to:

1. Identify himself and try to develop the nation.
2. Implement how to dedicate themselves for the development of their organization and career.
3. Use of technical vocabulary properly,
4. Develop good manners in their life.
5. Realize their parent's consciousness towards them.

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B.Tech. CE	**L**	**T-P-D**	**C**
I Year - II Semester	**4**	**0-0-0**	**4**

(E122A) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to CE,ME & MIE)

Course Objectives:

The student will

1. describe Electric Circuits.
2. acquire knowledge the given circuit with various theorems and methods.
3. Learn in recognizing of basic electronic devices such as Diodes, Transistors, to build circuits like amplifiers and oscillators etc.
4. acquire knowledge on the various parameters useful for designing lectronic system.
5. acquire the knowledge of various configurations, characteristics and applications.

UNIT – I: Electrical circuits

R-L-C Parameters, voltage and current, Independent and Dependent Sources, Source Transformation-V-I relationship for passive elements, Kirchhoff's Laws, Network reduction techniques-series, parallel, series-parallel, star-to-delta, delta-to-star transformation, Nodal Analysis .

Single Phase AC Circuits : R.M.S. and Average values, Form Factor, steady state analysis of series, parallel and series-parallel combinations of R, L and C with sinusoidal excitation, concept of reactance, impedance, susceptance and admittance –phase and phase difference, concept of power factor, phasor notation, complex and polar forms of representation.

UNIT-II: Resonance

Series and parallel resonance circuits, concept of bandwidth and Q factor, Locus Diagrams for RL, RC and RLC Combinations for various parameters.

Network Theorems: Thevenin's, Norton's, Maximum power Transfer, Superposition, Reciprocity, Tellegen's, Milliman's and Compensation theorems for DC and AC excitations.

UNIT-III: P-N Junction Diode

P-N junction as a Diode, Symbol, Diode equation, volt-Ampere characteristics, Temperature dependence, Ideal versus practical Diode, static and dynamic resistances, Diffusion and Transition Capacitances.

Rectifiers and Filters: Diode rectifier, Half wave Rectifier, Ripple Factor-Full Wave Rectifier, Bridge Rectifier, Rectifiers with Filters: Inductive Filters, Capacitive Filters, L-section Filters, π-section Filters.

UNIT-IV: Bipolar Junction Transistor (BJT)

Symbol, Construction, principle of Operation, Current Components in a junction transistor Common Emitter, Common Base and Common Collector configurations.

Transistor Biasing -Operating point, DC and AC load lines, Fixed Bias, Collector to Base bias, Self Bias (Voltage divider bias), Bias stability, Stabilization against variations in V_{BE} , β, and $I_{co.}$

Small signal Transistor Analysis, h- Parameters, Definitions, Determination of h-parameters from CE transistor characteristics, Analysis of CE, CB and CC configurations using h-parameters and their Comparison.

UNIT-V: Junction Field Effect Transistor

Construction, Principle of Operation, pinch-off voltage, Volt-Ampere characteristics, comparison of BJT and JFET, small signal Model, MOSFET: Depletion and Enhancement FETs-construction characteristics.

Special Purpose Devices: Breakdown Mechanisms in semi-Conductor Diodes, Zener diode characteristics, Zener diode as a simple regulator, principle of operation and Characteristics of Tunnel Diode (with help of Energy band diagram) Varactor Diode, Principle of operation of SCR.

TEXT BOOKS:

1. Millman's Electronic Devices and circuits –J.Millman and C.Halkias, Mc Graw Hill
2. Micro Electronics by David bell
3. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.

REFERENCES:

1. Network Theory by N.C.Jagan and C.Lakshminarayana, B.S.Publications.
2. Electronic Devices and Circuits- R.L.Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
3. Engineering circuit analysis-by William Hayt and Jack E.Kemmerly, Mc Graw Hill Company, 6th edition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches)-2nd edition by Raymond A.DeCarlo and Pen-Min-Lin, Oxford University Press-2004.

Course Outcomes:

The student will be able to:

1. demonstrate strong fundamental back ground in Electrical Engineering.
2. analyze and solve problems of ac and dc circuits.
3. identify the value of different resistors.
4. analyze and design various electronic circuits through various numerous
5. design examples using currently-available devices and standard-value components

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B.Tech. CE	**L**	**T-P-D**	**C**
I Year - II Semester	**0**	**0-3-0**	**2**

(E1201) ENGINEERING CHEMISTRY LAB

(Common to CE,EEE,ME,ECE,CSE,IT,ECM&MIE)

Course Objective:

The student will

1. understand the importance of Chemical analysis in their daily life
2. perform the different practical skills in conducting the lab experiments
3. analyze the different results of the experiments when different external factors are being applied
4. acquire experimental skills
5. prepare more environment friendly engineering compounds at low cost

Experiments:

1. Determination of Conc. of $KMnO_4$ by colorimetric method.
2. Estimation of copper by colorimetric method.
3. Conductometric titration of mixture of acids vs strong base.
4. Titration of strong acid vs strong base by potentiometry.
5. Determination of pH of the given solution.
6. Determination of viscosity of sample oil by redwood viscometer
7. Preparation of Fe nanoparticles
8. Estimation of hardness of water by EDTA method.
9. Estimation of manganese dioxide in pyrolusite.
10. Determination of Surface tension of lubricants
11. Preparation of Aspirin
12. Preparation of Thiokol rubber

Note: Minimum 10 experiments must be performed.

Course Outcomes:

The student will be able to

1. identify the importance of chemical analysis in their daily life.
2. use different practical skills to analyse the results associated with the experiments build practical skills.
3. develop new environmental friendly and cost effective engineering compounds.
4. analyze the concepts of laboratory procedure.
5. determine the partition coefficient of a organic compound in two immiscible liquids.

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B.Tech. CE	**L**	**T-P-D**	**C**
I Year - II Semester	**0**	**0-3-0**	**2**

(E1204) ENGLISH LANGUAGE COMMUNICATION SKILLS (ELCS) LAB

(Common to CE, ME & MIE)

The **English Language Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:

The student will:

1. recognize sounds of English .
2. apply stress and intonation while speaking .
3. develop Listening skills.
4. develop introducing himself and others.
5. understand how to describe, debate and knows the types of presentations.

Syllabus: English Language Communication Skills Lab (ELCS) shall have two parts:

- **Computer Assisted Language Learning (CALL) Lab**
- **Interactive Communication Skills (ICS) Lab**

Listening Skills:

Objectives

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

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

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

Speaking Skills:

Objectives

To involve students in speaking activities in various contexts

To enable students express themselves fluently and appropriately in social and professional contexts :

b) Oral practice
c) Describing objects/situations/people
d) Role play – Individual/Group activities
e) Just A Minute (JAM) Sessions.

The following course content is prescribed for the **English Language Communication SkillsLab**.

Exercise – I

CALL Lab:

Understand: Listening Skill- Its importance–Purpose- Process- Types- Barriers- EffectiveListening.

Practice: Introduction to Phonetics–Speech Sounds–Vowels and Consonants– MinimalPairs- Consonant Clusters- Past Tense Marker and Plural Marker.

Testing Exercises

ICS Lab:

Understand: Spoken vs. Written language- Formal and Informal English.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues–Greetings– TakingLeave – Introducing Oneself and Others.

Exercise – II

CALL Lab:

Understand: Structure of Syllables–Word Stress–Weak Forms and Strong Forms– SentenceStress – Intonation.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Sentence Stress – Intonation.

Testing Exercises

ICS Lab:

Understand: Features of Good Conversation–Strategies for Effective Communication.

Practice: Situational Dialogues–Role-Play- Expressions in Various Situations– MakingRequests and Seeking Permissions - Telephone Etiquette.

Exercise - III

CALL Lab:

Understand: Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British andAmerican Pronunciation.

Testing Exercises

ICS Lab:

Understand: Descriptions- Narrations- Giving Directions and Guidelines.

Practice: Giving Instructions–Seeking Clarifications–Asking for and Giving Directions– Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise – IV

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests.

Testing Exercises

ICS Lab:

Understand: Public Speaking–Exposure to Structured Talks - Non-verbal Communication- Presentation Skills.

Practice: Making a Short Speech–Extempore- Making a Presentation.

Exercise – V

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests.

Testing Exercises

ICS Lab:

Understand: Group Discussion- Interview Skills.

Practice: Group Discussion- Mock Interviews.

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab:**

   The Computer Assisted Language Learning Lab has to accommodate 40 students with40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

   System Requirement (Hardware component):

   Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

   Computers with Suitable

   Configuration High Fidelity

   Headphones

2. **Interactive Communication Skills (ICS) Lab:**

   The Interactive Communication Skills Lab: A Spacious room with movable chairs andaudio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo –audio and video system and camcorder etc.

Lab Manuals:

1. A book entitled "***ELCS Lab Manual– A Workbook for CALL and ICS Lab Activities"*** by Board of Editors: Hyderabad: Orient BlackSwan Pvt. Ltd. 2016. Print.
2. Hart, Steve; Nair, Aravind R.; Bhambhani, Veena. ***"EMBARK- English forundergraduates"*** Delhi: Cambridge University Press. 2016. Print.
   Suggested Software:
3. Cambridge Advanced Learners' English Dictionary with CD.
4. Grammar Made Easy by Darling Kindersley.
5. Punctuation Made Easy by Darling Kindersley.
6. Oxford Advanced Learner's Compass, 8th Edition.

7. English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
9. TOEFL and GRE (KAPLAN, AARCO and BARRONS, USA, Cracking GRE by CLIFFS).

REFERENCES:

1. Jayashree Mohanraj. *Let Us Hear Them Speak*. New Delhi: Sage Texts. 2015. Print.
   Hancock, M. *English Pronunciation in Use. Intermediate Cambridge*: Cambridge University Press. 2009. Print.

Course Outcomes:

The student will be able to:

1. Develop correct pronunciation.
2. Use stress and intonation properly while speaking and writing.
3. Develop listening skills
4. Describe himself and others in day to day life situations.
5. Acquire debating and oral presentation skills.

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B.Tech. CE	**L**	**T-P-D**	**C**
I Year - II Semester	**0**	**0-3-0**	**2**

(E1205) ENGINEERING WORKSHOP

(Common to CE, ME & MIE)

Course Objectives:

The student will

1. execute application of various tools in carpentry, lathe machine works, house wiring
2. recognize application of metal cutting and drilling
3. analyse to perform various shape of wood material and metals
4. fabricate metal items using welding and power tools
5. demonstrate the works in foundry and plumbing

TRADES FOR EXERCISES:

1) Carpentry
2) Fitting
3) Tin-Smithy and Development of jobs carried out and soldering.
4) Black Smithy
5) House-wiring
6) Foundry
7) Welding

TRADES FOR DEMONSTRATION AND EXPOSURE:

Plumbing, Machine Shop, Power tools in construction, wood working and mechanical engineering.

Course Outcomes:

The student will be able to

1. Identify the tools used in workshop of different trades.
2. Practice the carpentry works of small shape and size.
3. Demonstrate the basic fitting and electrical works using the required tools
4. Fabricate metal items using welding and power tools
5. Demonstrate the works in foundry and plumbing

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B.Tech. CE	**L**	**T-P-D**	**C**
I Year - II Semester	**2**	**0-0-0**	**0**

(E120E) ENVIRONMENTAL STUDIES

(Common to CE,EEE,ECE & ECM)

Course Objectives:

The student will

1. discover about the different natural resources available and how to use them.
2. reads about biodiversity.
3. reads about environmental impact assessment and management.
4. studies about the global environmental problems.
5. studies about sustainability.

UNIT-I : Ecosystems , Natural Resources & **Biodiversity** concept, Classification of Resources: Water resources, Land resources, Forest resources, Mineral resources , Energy resources. Concept of ecosystem, Classification of ecosystem, Functions of ecosystem. Biodiversity, levels, hotspots, values of biodiversity, threats to biodiversity, conservation of biodiversity.

UNIT-II: Global Environmental Problems And Global Efforts

Deforestation Green house effect, Global Warming, Sea level rise, Ozone depletion. International conventions/protocols green-belt-development, Concept of Green Building, Clean Development Mechanism(CDM).

Environmental Impact Assessment (Eia) And Environmental Management Plan: definition of Impact, classification of impacts, methods of baseline data acquisition. Impacts on different components: such as human health resources, air, water, flora, fauna and society, impact assessment methodologies. Environmental management plan (EMP)

UNIT-III: **Environmental Policy, Legislation, Rules And Regulations & Towards Sustainable Future**

Concept of Sustainable Development, Threats to Sustainability, Strategies for achieving Sustainable development, Environmental Ethics, Environmental Economics, Concept of Green Computing.

TEXT BOOKS:

1. Text Book Of Environmental Science And Technology By M.Anji Reddy 2007
2. Principles of Environmental Science and Engineering by P.Venugopal Rao
3. Introduction to Environmental Studies by K.Mukkanti
4. Text book of Envirtonmental Studies by Kaushik&Anubha Kaushik

REFERENCES:

1. Tata McgrawHill : Introduction to Environmental Studies by Benny Joseph
2. Environmental studies by ErachBharucha 2005, University Grants Commission, University Press

Course Outcomes:

The student will be able to

1. Learn the importance of natural resources and use them efficiently.
2. Identify how to protect and conserve the biodiversity
3. Use environmental plan in developing any sort of environmental projects
4. Apply the environmental legislation in every walk of life
5. Explain importance of the natural resources for their future generations in a sustainable manner.

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B.Tech. CE	**L**	**T-P-D**	**C**
II Year - I Semester	**3**	**1-0-0**	**3**

(E210A) Numerical Techniques and Transforms
(Common to CE. MIE & ME)

Course Objectives:

The student will

1. Learn various difference operators and interpolation techniques.
2. Identify and classify the numerical problem to be solved
3. Understand the nature of curve and learn to trace it in a proper coordinate system.
4. Understand the properties of fourier series and fourier integral transforms which are mathematical devices from which we obtain the solutions of boundary value problems related to engineering
5. Learn properties of Z-transforms and solve the difference equations, fundamental concepts of PDE theory and analytical methods for solving PDEs.

UNIT–I:

Finite Differences and Interpolation

Finite Differences- Differences of Polynomial- Factorial Notation-Relation between the operators-To find one or more missing terms- Newton's interpolation formulae-Central Difference Interpolation Formulae-Gauss Interpolation Formulae-Interpolation with unequal intervals-Lagrange's interpolation

UNIT–II:

Numerical Solution of Partial Differential Equations

Introduction-Classification of second order equations-Finite approximation to derivatives-Elliptic Equations-Solution of Laplace equations-Solutions Poisson's equation-Parabolic Equations-Solution of heat equation-Hyperbolic Equations-Solution of Wave equation

UNIT–III:

Applications of Derivatives:

Radius, center and circle of curvature, evolutes and envelopes.

Tracing of curves in Cartesian, and polar forms.

UNIT–IV:

Fourier Series

Introduction-Euler's Formulae-Conditions foe Fourier Expansion-Functions having points of Discontinuity-change of interval-Odd and Even Function-Expansions of Odd or Even periodic functions-Half range series

UNIT-V:

Transforms

Introduction-Definition-Some Standard Z-Transforms-Linearity Property-Damping Rule-some standard result-Shifting u_n to the right and to the left Multiplication by n-Two basic theorems (Initial and Final) – Some useful Z-transforms-Some useful inverse Z-transforms-Convolution Theorem-Convergence of Z-Transforms-Two side Z-Transform-Evaluation of Z-Transforms-Applications to Difference Equations

Text Books:

1. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers.
2. Advanced Engineering Mathematics by E. Kreyszig, John Wiley and Sons Publisher

References:

1. Engineering Mathematics by N. P. Bali, Lakshmi Publications.
2. Introductory methods of Numerical analysis by S.S.Sastry, PHI Learning Pvt.Ltd

Course Outcomes:

The student will be able to:

1. Use the concept of interpolation, finite difference operators and their relations, and apply different interpolation techniques on equi-spaced or non equi-spaced data values.
2. Formulate partial differential equations (PDEs) and seek understanding of their solutions, either obtained exactly or approximately by analytic or numerical methods, concept of a solution to an initial value problem.
3. Change the form of curve given in one co-ordinate system to another thereby tracing it in an easy way.
4. Acquire the knowledge of representation of a function as a Fourier series and apply the Fourier integral transforms in areas of engineering related to conduction of heat, free and forced vibrations of a membrane, transverse vibrations of a string etc.
5. Demonstrate the use of the transform technique of Z-transforms for discrete time signals and systems acquire knowledge in the technical methodology of solving Partial Differential Equations

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(E211A) STRENGTH OF MATERIALS-I

Course Objectives:

The student will

1. Study the engineering properties of materials and solids and analyze the same to evaluate the stress-strain behavior
2. Acquire the knowledge of strength of materials on engineering applications.
3. Be provided with concept of shear force and bending moment.
4. Study the concept on deflections of different beams under different types of loadings.
5. Study the strain energies under the application of axial sudden and impact loadings.

UNIT–I:

SIMPLE STRESSES AND STRAINS:

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

STRAIN ENERGY – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

UNIT–II:

SHEAR FORCE AND BENDING MOMENT:

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

UNIT–III:

FLEXURAL STRESSES:

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

SHEAR STRESSES:

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

UNIT–IV:

DEFLECTION OF BEAMS:

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

CONJUGATE BEAM METHOD:

Introduction – Concept of conjugate beam method. Difference between a real beam and a conjugate beam. Deflections of determinate beams
with constant and different moments of inertia.

UNIT-V:

PRINCIPAL STRESSES AND STRAINS :

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

THEORIES OF FAILURE:

Introduction – Various theories of failure - Maximum Principal Stress Theory, Maximum Principal Strain Theory, Maximum shear stress theory- Strain Energy and Shear Strain Energy Theory (Von Mises Theory).

Text Books:

1. Strength of Materials by R.K.Bansal, Lakshmi Publications House Pvt. Ltd.
2. Strength of Materials by R.K Rajput, S.Chand & Company Ltd.

References:

1. Strength of Materials by S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.
2. Mechanics of Structures Vol –I by H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.
3. Strength of Materials by D.S Prakash Rao, Universities Press Pvt. Ltd.

Course Outcomes:

The student will be able to

1. Learn the concepts of stress, strain, elasticity and the relation between all the elastic constants for homogenous, isotropic materials.
2. Learn the concept of strength of materials on engineering applications
3. Construct the shear force and bending moment diagrams for any given loading
4. Calculate the deflection of a beam, at any given point, when subjected to different loadings.
5. Learn the concept of strain energy under the application of different loadings.

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(E211B) SURVEYING

Course Objectives:

The student will

1. Be introduced to the importance of surveying in the field of civil engineering.
2. Study the basics of linear/angular measurement methods like chain surveying, compass surveying.
3. Gain the knowledge about significance of plane table surveying in plan making
4. Be provided with the basics of leveling and theodolite survey in elevation and angular measurements
5. Acquaint to the program on tachometric surveying in distance and height measurements.

UNIT–I:

Introduction and Basic Concepts

Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying.

Measurement of Distances and Directions

Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections, Indirect methods- optical methods- E.D.M. method.

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination and dip

UNIT–II:

Leveling and Contouring

Leveling- Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.

Computation of Areas and Volumes

Areas- Determination of areas consisting of irregular boundary and regular boundary (coordinates, MDM, DMD methods), Planimeter.

Volumes- Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

UNIT–III:

Theodolite Surveying

Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.

Traversing

Methods of traversing, traverse computations and adjustments, Gale's traverse table, Omitted measurements.

UNIT–IV:

Tacheometric Surveying

Principles of Tacheometry, stadia and tangential methods of Tacheometry.

Curves: Types of curves and their necessity, elements of simple curve, setting out of simple Curves, Introduction to compound curves.

UNIT-V:

Modern Surveying Methods

Total Station and Global Positioning System. : Basic principles, classifications, applications, comparison with conventional surveying. Electromagnetic wave theory - electromagnetic distance measuring system - principle of working and EDM instruments, Components of GPS – space segment, control segment and user segment, reference systems, satellite orbits, GPS observations. Applications of GPS.

Text Books:

1. Chandra A M, “Plane Surveying”, New age International Pvt. Ltd., Publishers, New Delhi, 2002.
2. Chandra A M, “Higher Surveying”, New age International Pvt. Ltd., Publishers, New Delhi, 2002.

References:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill – 2000
2. Arora K R “Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004
3. Surveying (Vol – 1, 2 & 3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi

Course Outcomes: The student will be able to

1. Carry out preliminary surveying in the field of civil engineering applications such as structural, highway and geotechnical engineering
2. Apply out plan survey, accurate measurements, field books, plotting and adjustment of traverse using various conventional instruments involved in surveying with respect to utility and precision.
3. Apply the knowledge about the various aspects of surveying
4. Analyze the concept of Plot traverses/sides of building and determine the location of points present on field on a piece of paper.
5. Take accurate measurements, field booking, plotting and adjustment of errors can be understood

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(E211C) FLUID MECHANICS

Course Objectives:

The student will

1. Provided with the fundamentals of fluid mechanics, pressure exerted by fluids, measurement of pressure and Forces on submerged bodies.
2. Introduced to different types of fluid flows; different methods applied for describing fluid in motion.
3. Helped in learning about different types of energies associated with Fluid in motion.
4. Introduced to the measurement of flow in pipes and in open channels.
5. Understanding the concept of equivalent pipe; Energy losses in flow in pipe Develop an understanding of fluid dynamics in civil engineering.

UNIT–I:

INTRODUCTION: Dimensions and units – Physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion pressure at a point, Pascal's law, Hydrostatic law - atmospheric, gauge and vacuum pressure-measurement of pressure. Pressure gauges, Manometers: differential and Micro Manometers. Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure. Derivations and problems.

UNIT–II:

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

UNIT–III:

FLUID DYNAMICS and Measurement of Flow: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, (Navier – stokes equations (Explanatory) Momentum equation and its application – forces on pipe bend. Pitot tube, Venturimeter and orifice meter – classification of orifices, flow over rectangular, triangular and trapezoidal and Stepped notches - –Broad crested weirs

UNIT–IV:

CLOSED CONDUIT FLOW: Reynold's experiment – Characteristics of Laminar & Turbulent flows. Laws of Fluid friction – Darcy's equation,, variation of friction factor with
Reynold's number – Moody's Chart, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line. Pipe network problems Flow between parallel plates, Flow through long tubes, flow through inclined tubes.

UNIT-V:

BOUNDARY LAYER THEORY: Approximate Solutions of Navier Stoke's Equations – Boundary layer – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent Boundary layers (no derivations) BL in transition, separation of BL, control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

Text Books:

1. Fluid Mechanics by Modi and Seth, Standard book house.
2. Introduction to Fluid Machines by S.K.Som & G.Biswas (Tata Mc.Grawhill publishers Pvt. Ltd.)

References:

1. Fluid Mechanics by J.F.Douglas, J.M. Gaserek and J.A.Swaffirld (Longman)
2. Fluid Mechanics by Frank.M. White (Tata Mc.Grawhill Pvt. Ltd.)
3. Fluid Mehanics by A.K. Mohanty, Prentice Hall of India Pvt. Ltd., New Delhi

Course Outcomes:

The student will be able to

1. Demonstrate the various physical properties of fluid, characteristics of various fluid flows, computation of displacement, velocity and acceleration of a fluid in motion.
2. Apply Laminar and turbulent flows, significance of Reynold's experiment, computation of velocity and discharge for laminar and turbulent flows across pipes
3. Apply laws of conservation of mass, energy and momentum Compute the discharge and velocity across weirs and notches.
4. Analyze the concept of measurement of flow in pipes and flow in open channels
5. Develop various losses in pipe flows, compute the losses in pipe flow in series and parallel.

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(E211D) BUILDING MATERIALS, CONSTRUCTION AND PLANNING

Course Objectives:

The student will

1. Study about the basic building material properties and their applications.
2. Know the basic properties of cement
3. Know smart building materials, types of paints and varnishes.
4. Understand different types of masonries and their applications.
5. Acquire concepts in building planning, arrangement of windows, doors, electrical and plumbing services

UNIT–I:

Stones and Bricks, Tiles:

Building stones – classifications and quarrying – properties – structural requirements – dressing Bricks – Composition of Brick earth – manufacture and structural requirements.

Wood, Aluminum, Glass and Paints

Wood - structure – types and properties – seasoning – defects; alternate materials for wood – GI / fibre – reinforced glass bricks, steel & aluminum.

UNIT–II:

Cement & Admixtures :

Ingredients of cement – manufacture – Chemical composition – Hydration - field & lab tests Admixtures – mineral & chemical admixtures – uses.

UNIT–III:

Building Components :

Lintels, Arches, walls, vaults – stair cases – types of floors, types of roofs – flat, curved, trussed ; foundations – types ; Damp Proof Course ; Joinery – doors – windows – materials – types.

Building Services :

Plumbing Services : Water Distribution, Sanitary – Lines & Fittings ; Ventilations : Functional requirements systems of ventilations. Air-conditioning - Essentials and Types ; Acoustics – characteristic – absorption – Acoustic design ; Fire protection – FireHarzards – Classification of fire resistant materials and constructions

UNIT–IV:

Masonry and Finishing's Brick masonry – types – bonds ; Stone masonry – types ; Composite masonry – Brick-stone composite ; Concrete, Reinforced brick. Finishers : Plastering, Pointing, Painting, Claddings – Types – Tiles - ACP

Form work : Requirements – Standards – Scaffolding – Design ; Shoring, Underpinning.

UNIT-V:

Building Planning : Principles of Building Planning, Classification of buildings and Building by laws.

Text Books:

1. Building Materials and Construction – Arora & Bindra, Dhanpat Roy Publications
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi

References:

1. Building Materials by Duggal, New Age International.
2. Building Materials by P.C.Varghese, PHI.
3. Building Construction by PC Varghese PHI.

Course Outcomes:

The student will be able to

1. Identify various building materials and select suitable type for given situation.
2. Know the properties of cement as building material.
3. Know different types of masonry, types of bonds used in construction of walls of buildings.
4. Know the different types of doors, windows, roofs, staircase used in building works.
5. Plan suitable types of building for given requirement including arrangement of electrical and plumbing services..

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II Year - I Semester	**0**	**0-3-0**	**2**

(E2101) SURVEYING LAB

Course Objectives:

The student will :

1. Apply the basic principles of engineering surveying and measurements
2. Follow effectively the field procedures required for a professional surveyor
3. Use techniques, skills and conventional surveying instruments necessary for engineering practice.
4. Measure height and distances for accessible and inaccessible points.
5. Learn leveling methods.

LIST OF EXPERIMENTS:

1. Surveying of an area by chain survey (closed traverse) & plotting
2. Chaining across obstacles
3. Determination of distance between two inaccessible points using compass
4. Surveying of a given area using prismatic compass (closed traverse) and plotting after adjustments
5. Radiation method, intersection methods by plane table survey.
6. Two point and three point problem in plane table survey.
7. Traversing by plane table survey.
8. Leveling – Longitudinal and cross-section and plotting Fly leveling
9. Trigonometric leveling using theodolite
10. Height and distances using principles of tacheometric surveying
11. a) Measurement of Horizontal angle & vertical angle.
    b) Distance between inaccessible point by theodolite

Course outcomes:

The students will be able to

1. Apply the basic principles of engineering surveying for linear and angular measurements.
2. Comprehend effectively the field procedures required for a professional surveyor.
3. Use techniques, skills and conventional surveying instruments necessary for engineering practice.
4. take accurate measurements, field booking, plotting and adjustment of errors can be understood
5. plot traverses / sides of building and determine the location of points present on field on a piece of paper.

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II Year - I Semester	**0**	**0-3-0**	**2**

(E2102) STRENGTH OF MATERIALS LAB

Course Objectives:

The student will

1. understand the basic principles in the area of strength and mechanics of materials and structural analysis to the undergraduate students through a series of experiment
2. find the young modulus, to determine the strength of steel any other building materials.
3. identify the Hardness and tensile strength of given specimen.
4. understand professional and ethical responsibility in the areas of material testing.
5. study the mechanical properties of materials.

LIST OF EXPERIMENTS:

1. Tension test.
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simply supported 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.

Course Outcomes:

The student will be able to

1. Apply Strength to different materials, hardness and properties.
2. Analyze the Young's modulus using deflection test on beams and tensile test on rods.
3. Apply the procedures for conducting tensile, torsion tests on mild steel specimens.
4. Identify, formulate and solve engineering problems of structural elements subjected to flexure.
5. Evaluate the impact of engineering solutions on the society and will be aware of contemporary issues regarding failure of structures due to unsuitable materials

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(E2103) CAD Lab-I

Course Objectives:

The student will

1. Understand the fundamentals of graphics and drafting appropriate for developing functional skill in computer aided drafting.
2. Acquire adequate knowledge and experience in preparing engineering drawings using AutoCAD.
3. Gain knowledge about 'read, construct and understand' basic Civil engineering drawings.
4. Acquire the skills pertinent to the production of properly detailed, formatted and dimensioned Civil Engineering drawings.
5. Understand the concept and techniques to draw.

LIST OF EXPERIMENTS:

1. Introduction to computer aided drafting.
2. To open and set up a software in system.
3. Introduction to tools in CAD.
4. Setting up the coordinate system and units
5. Introduction to how to draw in AUTO CAD.
6. Practice of common symbols used in CAD drawings.
7. Software for CAD – Introduction to different software.
8. Practice exercises on CAD software.
9. Detailing of building components like Doors, Windows, Roof Trusses etc. using CAD software's
10. Drawing a plan of buildings using software - single storied residential building.
11. Drawing a plan of building using software - multi storied residential building.
12. Drawing a plan of buildings using software - single storied commercial building.
13. Drawing a plan of buildings using software - multi storied commercial building.
14. Exercises on development of working drawings of buildings

Course Outcomes:

The student will be able to

1. Use different AutoCAD Commands to develop Plan, Section and elevation of single Storied and Multi Storied Buildings.
2. Draw and detail different Components of structure.
3. Develop Working Drawings of Residential Buildings, prepare drawing with detail layout.
4. Develop different components of buildings.
5. Develop working drawings of buildings with detailed layout

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II Year - II Semester	**3**	**1-0-0**	**3**

(E221A) ENVIRONMENTAL ENGINEERING

Course Objectives:

The student will

1. Acquire The knowledge of water sources.
2. Study the design of distribution systems.
3. Understand the effects of pollutants on the environment
4. Study The methods of planning to control, reduce, and monitor pollution.
5. Learn Suitable techniques for treatment of water, waste water and contaminated air.

UNIT–I:

Introduction: Waterborne diseases – protected water supply – Population forecasts, design period – types of water demand – factors affecting – fluctuations – fire demand – water quality and testing – drinking water standards: sources of water - Comparison from quality and quantity and other considerations – intakes – infiltration galleries.

UNIT–II:

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:

Distribution systems requirement –method and layouts -Design procedures- Hardy Cross and equivalent pipe methods pipe – joints, valves such as sluice valves, air valves, scour valves and check valves water meters – laying and testing of pipe lines – pump house - Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – storm water overflows combined flow

UNIT–IV:

Characteristics of sewage – cycles of decay – decomposition of sewage, examination of sewage – B.O.D. Equation – C.O.D. 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.

UNIT-V:

Waste water treatment plant – Flow diagram - 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 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 & Environmental Engineering by A.K. Chatterjee.

References:

1. Water and Waste Water Technology by Steel
2. Water and Waste Water Engineering by Fair Geyer and Okun
3. Text book of Environmental Engineering by P. Venugopal Rao (PHI)

Course Outcomes:

The student will be able to

1. Understand the impact of humans on environment and environment on humans
2. Identify and value the effect of the pollutants on the environment.
3. Plan strategies to control, reduce and monitor pollution
4. Select the most appropriate technique for the treatment of water, wastewater and contaminated air.
5. Design the components of the distribution systems

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(E221B) STRENGTH OF MATERIALS-II

Course Objectives:
The student will

1. Be introduced about springs and their various types of combination connections.
2. Gain Knowledge about columns and struts with different end conditions and awareness about laterally loaded struts.
3. Visualize direct and bending stresses in concrete structures like retaining wall, chimney and dam.
4. Understand unsymmetrical bending and beams curved in plan.
5. Be introduced about hoop and longitudinal stresses in thin cylinders and thick cylinders.

UNIT–I:
TORSION OF CIRCULAR SHAFTS: Theory of pure torsion – Derivation of Torsion equations : $T/J = q/r = N\theta/L$ – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.
SPRINGS: Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel – Carriage or leaf springs.

UNIT–II:
COLUMNS AND STRUTS: Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- assumptions- derivation of Euler's critical load formulae for various end conditions– Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae – Straight line formula – Prof. Perry's formula.
BEAM COLUMNS: Laterally loaded struts – subjected to uniformly distributed and concentrated loads – Maximum B.M. and stress due to transverse and lateral loading.

UNIT–III:
DIRECT AND BENDING STRESSES: Stresses under the combined action of direct loading and bending moment, 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 bending moment about both axis.
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.

UNIT–IV:
THIN CYLINDERS: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in

diameter, and volume of thin cylinders – Thin spherical shells.

THICK CYLINDERS: Introduction - 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.

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: Introduction - Shear center for symmetrical and unsymmetrical (channel, I, T and L) sections

Text Books:

1. A Text book of Strength of materials by R.K.Bansal –Laxmi Publications (P) ltd., New Delhi
2. Strength of materials by S. Ramamrutham- Dhanpat rai publishing company

References:

1. Mechanics of Solid, by Ferdinandp Beer and others – Tata Mc.Grawhill Publications 2000.
2. Strength of Materials by S. Ramakrishna and R.Narayan – Dhanpat Rai publications.
3. Strength of materials by R.K.Rajput, S.Chand & Co, New Delhi.

Course Outcomes:

The student will be able to

1. Understand the concepts and principles, understand the theory of elasticity, to perform calculations related to the strength of structures subjected to torsion and direct compression.
2. Evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for all types of loading conditions.
3. Analyze the strength and stability of structural members subjected to direct and bending stresses.
4. Understand and evaluate the shear center and unsymmetrical bending.
5. Apply the concept of calculating stresses in thin cylinders and thick cylinders..

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(E221C) HYDRAULICS AND HYDRAULIC MACHINERY

Course Objectives:

The student will

1. Acquire knowledge about open channel hydraulic and the working of hydraulic machinery.
2. Understand the basics of hydro-machinery and its components, function and use of different types of turbines and pumps.
3. Understand to use the dimensional analysis in solving fluid problems and plan hydraulic similitude studies.
4. Understand the application of momentum principle of impact of jets on plane and curved surfaces.
5. Understand the Knowledge regarding pump installation details and speed losses

UNIT–I:

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 G.V.F., Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT–II:

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. Distorted and non-distorted models

UNIT–III:

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–IV:

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

UNIT-V:

CENTRIFUGAL PUMP: installation details-classification-types work done- Manometric head-minimum starting speed-losses and efficiencies-specific speed multistage pumps-pumps in parallel- performance of pumps-characteristic curves- NPSH-cavitation.

Classification of Hydropower plants – Definition of terms – load factor, utilization factor, capacity factor, estimation of hydropower potential.

Text Books:

1. Open Channel flow by K,Subramanya . Tata Mc.Grawhill Publishers
2. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) ltd., New Delhi.

References:

1. Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard book house.
2. Elements of Open channel flow by Ranga Raju, Tata Mc.Graw Hill, Publications.
3. Fluid mechanics and fluid machines by Rajput, S.Chand &Co.

Course Outcomes:

The student will be able to

1. Demonstrate various theories dealing with the flow phenomenon of fluid in an open channel.
2. Apply basics of hydro-machinery and the components, function and use of different types of turbines and pumps.
3. Use the dimensional analysis in solving fluid problems and plan hydraulic similitude studies.
4. Calculate forces and work done by a jet on fixed or moving plate and curved plate.
5. Learn about centrifugal pumps and their applications.

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B.Tech. CE	**L**	**T-P-D**	**C**
II Year - II Semester	**3**	**0-0-0**	**3**

(E221D) ENGINEERING GEOLOGY

Course Objectives:

The student will

1. Learn the basic knowledge of Geology that is required for constructing various Civil Engineering Structures,
2. Study the basic knowledge on basic Geology, Geological Hazards and Environmental Geology
3. Understand the core activities of engineering geologists – site characterization and geologic hazard identification and mitigation.
4. Study the geological aspects in planning and construction of major Civil Engineering projects
5. Study the importance of different geological elements

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

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 commo n rock forming minerals:Feldsper , Quartz , Flint , Jasper, Olivine , Augite , Hornblende , Muscovite , Biotite ,Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite , Magnetite, Chlorite, Galena , Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT–II:

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 and microscopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate. Rock excavation, stone aggregates.

STRUCTURAL GEOLOGY:

Indian stratigraphy, and geological time scale**,** Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints - their important types.

UNIT–III:

EARTH QUAKES : 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 ground water, earth quakes and land slides

GEOPHYSICAL STUDY: 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. Fundamental aspects of Rock mechanics and Environmental Geology

UNIT–IV:

GEOLOGY OF DAMS , RESERVOIRS AND TUNNELS:

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. Factors Contributing to the success of a reservoir. Geological factors influencing water lightness and life of reservoirs, Geo hazards, ground subsidence.

TUNNELS:

Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (ie. Lithological, structural and ground water) in tunneling over break and lining in tunnels.

UNIT-V:

GROUND WATER:

Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. 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, land slides hazards, water in land slides their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, Earthquake and landslides.

Text Books:

1. Engineering Geology by N.Chennakesavulu, Mc-Millan, India Ltd. 2005
2. Engineering Geology for Civil Engineers – P.C. Varghese PHI

References:

1. Muthiayya, V.D. " A Text of Geology", Oxford IBH Publications, Calcutta, 1969
2. Blyth F.G.H. and de Freitas M.H., Geology for Engineers, Edward Arnold, London, 2010.
3. Bell .F.G.. "Fundamentals of Engineering Geology", B.S. Publications. Hyderabad 2011

Course Outcomes:

The student will be able to

1. Perform Site characterization and to collect, analyze, and report geological data using Standards in engineering practice.
2. Grasp the fundamentals of the engineering properties of Earth materials and fluids.
3. Do Rock mass characterization and the mechanics of planar rock slides and topples.
4. Utilize the different geological elements which are available at the construction site.
5. To Know the importance of geological hazards..

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B.Tech. CE	**L**	**T-P-D**	**C**
II Year - II Semester	**4**	**1-0-0**	**4**

(E221E) STRUCTURAL ANALYSIS

Course Objectives:

The student will

1. Introduced to the concept of Arches and analysis of statically indeterminate structures
2. Provided with the analysis of deflections of beams and trusses using Castigliano's first theorem and moment distribution method
3. Introduced to the effect of moving loads on structural members using influence line diagrams
4. Provided with flexibility and stiffness method for analysis of statically indeterminate structures.
5. Study effect of moving loads on structural members using influence line diagrams

UNIT–I:

ANALYSIS OF PERFECT FRAMES: Types of frames- Perfect, Imperfect and Redundant pin jointed frames. - Analysis of determinate pin jointed frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads

UNIT–II:

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano‟s first theorem-Unit Load Method. Deflections of simple beams and pin- jointed plane trusses. Deflections of statically determinate bent frames.

THREE HINGED ARCHES – Introduction – Types of Arches – Comparision between Three hinged and Two hinged Arches. Linear Arch. Eddy‟s theorem. Analysis of Three hinged arches. Normal Thrust and radial shear in an arch. Geometrical properties of parabolic and circular arch. Three hinged circular arch at different levels. Absolute maximum bending moment diagram for a three hinged arch.

UNIT–III:

PROPPED CANTILEVER and FIXED BEAMS: Determination of static and kinematic indeterminacies for beams- Analysis of Propped cantilever and fixed beams, including the beams with different moments of inertia, subjected to uniformly distributed 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 for Propped Cantilever and Fixed Beams-Deflection of Propped cantilever and fixed beams; effect of sinking of support, effect of rotation of a support.

UNIT–IV:

CONTINUOUS BEAMS: Introduction-Continuous beams. Clapeyron‟s theorem of three moments- Analysis of continuous beams with constant and variable moments of inertia with one or both ends fixed-continuous beams with overhang. Effects of sinking of supports.

SLOPE DEFLECTION METHOD: Derivation of slope-deflection equation, application to continuous beams with and without settlement of supports. Determination of static and kinematic indeterminacies for frames. Analysis of Single Bay – Single storey Portal Frames by Slope Deflection Method Including Side Sway. Shear force and bending moment diagrams and Elastic curve.

UNIT-V:

MOVING LOADS and INFLUENCE LINES: 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-Equivalent uniformly distributed load-Focal length.

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 - Point loads, UDL longer than the span, UDL shorter than the span- Influence lines for forces in members of Pratt and Warren trusses. Equivalent uniformly distributed load. Focal length.

Text Books:

1) Structural Analysis Vol –I & II by V.N.Vazirani and M.M.Ratwani, Khanna Publishers.
2) Structural Analysis Vol I & II by G.S.Pandit and S.P.Gupta, Tata McGraw Hill Education Pvt. Ltd.

References:

1) Structural Analysis by R.C.Hibbeler, Pearson Education
2) Mechanics of Structures Vol – I and II by H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.
3) Structural Analysis by Devdas Menon, Narosa Publishing House.

Course Outcomes:

The student will be able to

1) Analyze the arch structures and behavior of structural members using slope deflection method
2) Analyze the behavior of structural members using moment distribution method and Castigliano’s first theorem.
3) Determine the effect of moving loads on structural members using influence line diagrams.
4) Solve statically determinate and indeterminate structures using matrix methods.
5) Determine the effect of moving loads on structural members using influence line diagrams

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B.Tech. CE	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-3-0**	**2**

(E2201) ENGINEERING GEOLOGY LAB

Course Objectives:

The student will

1. Understand the importance of geology in civil engineering.
2. Study the mega and microscopic properties of minerals
3. Study the mega and microscopic properties of rocks
4. Be Introduced to Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities.
5. Understand Drawing of Geological maps, showing Faults, Uniformities etc

EXPERIMENT 1 :Study of physical properties and identification of minerals Feldsper , Quartz , Flint .

EXPERIMENT 2 :Study of physical properties and identification of minerals Jasper, Olivine , Augite.

EXPERIMENT 3: Study of physical properties and identification of minerals Hornblende , Muscovite , Biotite.

EXPERIMENT 4 : Study of physical properties and identification of minerals Asbestos, Chlorite , Kyanite.

EXPERIMENT 5: Study of physical properties and identification of minerals Garnet, Talc , Calcite.

EXPERIMENT 6:Study of physical properties and identification of minerals,. Pyrite, Hematite , Magnetite.

EXPERIMENT 7: Study of physical properties and identification of minerals, Chlorite, Galena , Pyrolusite.

EXPERIMENT 8:Study of physical properties and identification of minerals Graphite, Magnesite, and Bauxite.

EXPERIMENT 9: Megascopic description and identification of rocks. Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate. Rock excavation, stone aggregates.

EXPERIMENT 10: Megascopic description and identification of minerals.

EXPERIMENT 11:Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc

EXPERIMENT 12:Simple Structural Geology problems.

EXPERIMENT 13: Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.

EXPERIMENT 14: Simple Structural Geology problems.

EXPERIMENT 15: . Electrical resistivity meter.

Course Outcomes:

The student will be able to

1. Learn the role of geology in the design and construction process of underground openings in rock.
2. Apply the knowledge on properties of minerals and use
3. Apply the knowledge on properties of rocks and use
4. Learn about Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities.
5. geologic expertise with the engineering properties of rock and unconsolidated materials.

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B.Tech. CE	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-3-0**	**2**

(E2202) ENVIRONMENTAL ENGINEERING LAB

Course Objectives:

The student will

1. Determine the physical characteristics of drinking water/sewage – turbidity.
2. Determine chemical characteristics of drinking water/sewage – pH, various types of solids, acidity, alkalinity, D.O etc.
3. Determine the chlorine dosage and residual chlorine in treated water sample.
4. Estimate Most Probable Number of given water sample and
5. Estimate optimum dosage of coagulant (Alum).

EXPERIMENT 1 : Determination of pH and Turbidity

EXPERIMENT 2: Determination of Conductivity and Total dissolved solids (Organic and Inorganic)

EXPERIMENT 3: Determination of Alkalinity/Acidity.

EXPERIMENT 4: Determination of Chlorides.

EXPERIMENT 5: Determination of iron.

EXPERIMENT 6: Determination of Dissolved Oxygen.

EXPERIMENT 7: Determination of Nitrates.

EXPERIMENT 8:. Determination of Optimum dose of coagulant

EXPERIMENT 9: Determination of Chlorine demand

EXPERIMENT 10: Determination of total Phosphorous.

EXPERIMENT 11: Determination of B.O.D

EXPERIMENT 12: Determination of C.O.D

EXPERIMENT 13: Presumptive coliform test.

Course Outcomes:

The student will be able to

1. Understand about the equipment used to conduct the test procedures
2. Perform the experiments in the lab
3. Examine and estimate water, waste water, air and soil quality
4. Compare the water quality standards with prescribed standards set by the local governments
5. Develop a report on the quality aspect of the environment Ascertain whether the given water is fit for drinking or not by comparing the quality parameters with BIS standards (IS 10500 – 1991)

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B.Tech. CE	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-3-0**	**2**

(E2203) FLUID MECHANICS & HYDRAULIC MACHINERY LAB

Course Objectives:

The student will

1. Gain practical knowledge in verification of principles of fluid flow.
2. Introduced to impart knowledge in measuring pressure, discharge and velocity of fluid flow.
3. Understand Major and Minor Losses.
4. Gain knowledge in performance testing of Hydraulic Turbines and Hydraulic Pumps at constant speed and Head.
5. study the characteristics of turbines and pumps

LIST OF EXPIREMENTS

EXPIREMENT 1: Calibration of Venturimeter & Orifice meter.

EXPIREMENT 2: Determination of Coefficient of discharge for a small orifice by constant head method.

EXPIREMENT 3: Determination of Coefficient of discharge for a mouthpiece by constant head method.

EXPIREMENT 4: Calibration of contracted Rectangular Notch and / Triangular Notch.

EXPIREMENT 5: Determination of friction factor of a pipe.

EXPIREMENT 6: Determination of Coefficient for minor losses.

EXPIREMENT 7: Verification of Bernoulli„s equation.

EXPIREMENT 8: Impact of jet on vanes.

EXPIREMENT 9: Performance test on Pelton wheel turbine.

EXPIREMENT 10: Performance test on Francis turbine.

EXPIREMENT 11: Performance characteristics of a single stage centrifugal pump.

EXPIREMENT 12: Performance characteristics of a multi-stage centrifugal pump.

Course Outcomes:

The student will be able to

1. Demonstrate about solid foundation in fluid flow principles.
2. Apply the knowledge in calculating performance analysis in turbines and pumps and can be used in power plants.
3. Analyze practical problems in all power plants.
4. Measure discharge in pipes.
5. Demonstrate the characteristics curves of turbines.

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B.Tech. CE	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-0-0**	**0**

(E2204) GENDER SENSITIZATION

(Common to all branches)

Course Objectives:

The student will

1. Develop students' sensibility with regard to issues of gender in contemporary India.
2. Study a critical perspective on the socialization of men and women.
3. Introduce students to information about some key biological aspects of genders.
4. Expose the students to debates on the politics and economics of work.
5. Reflect critically on gender violence.

UNIT–I:

Gender: Why should we study it?, Socialization: Making women, Making Men, Introduction, Preparing For Womanhood, Growing up male, First lessons in caste, Different masculinities.

UNIT–II:

Women's Work: Its Politics and Economics,

Fact and fiction, Unrecognized and unaccounted work, Further reading: Wages and conditions of work, Domestic Violence: Speaking Out, Is home a safe place?, When women unite [Film], Rebuilding lives, Further reading: New forums for justice.

UNIT–III:

Just Relationships: Being Together as Equals,

Mary kom and Onler, Love and acid just do not mix, Love letters, Mothers and fathers, Further Reading: Rosa Parks – The brave heart.

Text Books:

1. Towards a **world** of equals by A.Suneetha Susic Tharu publication Telugu academy Hyderabad.

Course Outcomes:

The student will be able to

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
4. Men and women students and professionals will be better equipped to work and live together as equals.
5. Students will develop a sense of appreciation of women in all walks of life

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B.Tech. CE	**L**	**T-P-D**	**C**
III Year - I Semester	**4**	**0-0-0**	**4**

(E310A) MANAGEMENT SCIENCE FOR ENGINEERS

Course Objectives:

The student will

1. The student should have understood the concepts of Demand analysis production and cost analysis like fixed cost variable cost marginal cost and importance of break even analysis.
2. The student should give an idea on different types of markets, strategic pricing, capital budgeting estimation and techniques.
3. The student should understand the concepts of management and its practices to meet the global challenges in effective and efficient manner
4. Different types of organization structures and their suitability and importance of HRM.
5. The student should know and apply the importance and vital role of the production, types of plant layout, statistical quality control concepts and project management techniques.

UNIT–I:

Introduction to Managerial Economics, Concepts of Managerial Economics:

Demand Analysis: Law of Demand, Elasticity of demand & Demand Forecasting.

Production and cost Analysis: Production functions, Laws of Returns, Economies of scale.

Cost Concepts: Different types of costs: Variable cost, Fixed cost, Marginal cost, Semi-variable cost. Break-even Analysis.

UNIT–II:

Market Structures: Different types of Markets.

Pricing: Methods of Pricing and strategies, Skimming and Penetration Pricing.

Capital budgeting: Estimation of fixed and working capital, Methods & sources of raising capital. Methods of capital budgeting, Traditional and Discounted Techniques.

Financial accounting & Financial Analysis: Overview of financial Accounts, Journal, Subsidiary books, Ledger, Trial Balance and Preparation of Trading Account, Profit & Loss Account and Balance Sheet. Financial Analysis with the help of Ratios.

UNIT–III:

Management: Functions of management. Taylor's scientific management theory, Fayol's principles of management.

Designing of organization structures: Different Methods with Merits and demerits and their suitability.

Human Recourse Management: Recruitment, Selection, Training and Development and Permanence Appraisal

UNIT–IV:

Operation Management: Types of plant layout, Methods of production, work, study-procedure involved in Methods study and work Measurement. Statistical quality control. $\bar{X}$, R, C & P charts.

Project Management: Programme Evaluation and Review Technique (P E R T), critical path method (C PM). Identification of critical path.

UNIT-V:

Material Management: Objectives, Need for Inventory Control, EOQ, ABC Analysis, VED Analysis, Purchase procedure, stores Management.

Marketing: Functions, Marketing Mix, Marketing strategies based on product life cycle, channels of distributions.

Text Books:

1. Managerial Economics& Financial Accounting – Prentice Hall of India: Dr.M.Kasi Reddy, Dr.S.Saraswathi
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2009.

References:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi, 2009
2. Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI, 2008.

Course Outcomes:

The student will be able to

1. The student should give an idea on different types of markets, strategic pricing, capital budgeting estimation and techniques.
2. The student should understand the concepts of management and its practices to meet the global challenges in effective and efficient manner,
3. The student should understand different types of organization structures and their suitability and importance of HRM.
4. The student should know and apply the importance and vital role of the production, types of plant layout, statistical quality control concepts and project management techniques.
5. The student should have understood the concepts of Inventory Control, EOQ, ABC Analysis, VED Analysis, Purchase procedure, stores Management. Functions, Marketing Mix, Marketing strategies based on product life cycle.

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B.Tech. CE	**L**	**T-P-D**	**C**
III Year - I Semester	**4**	**1-0-0**	**4**

(E311A) DESIGN OF REINFORCED CONCRETE STRUCTURES

Course Objectives:

The student will

1. Study the concept of R.C. Design of limit state method, working stress method, and use of I.S: 456 – 2000 Code Book.
2. Understand the concepts of design for shear, torsion and bond on various beams.
3. Be provided with the design of two way slabs, one way slab and continuous slab and also design of limit state for serviceability for deflection, cracking as per IS code provision.
4. Understand the design of short and long columns as per IS code provision.
5. Understand the design of different types of footings, design of isolated, square, rectangular, circular footings, and of stair cases**.**

UNIT–I:

Concepts of RC. Design – Working Stress Method - Limit State method – Material Stress-Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS – 456 – 2000.

Beams: Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections

UNIT–II:

Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing ; Design of canopy

UNIT–III:

Short and Long columns – under axial loads, uniaxial bending and biaxial bending – I S Code provisions

UNIT–IV:

Footings: Different types of footings – Design of isolated, square, rectangular, circular footings and combined footings.

UNIT-V:

Design of Two-way slabs, one way slab, and continuous slab Using I S Coefficients**,** Limit state design for serviceability for deflection, cracking and codal provision. Design of dog-legged staircase.

Text Books:

1. Limit state designed of reinforced concrete – P.C.Varghese, Prentice Hall of India, New Delhi.
2. Reinforced concrete design by S.Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.
3. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers, New Delhi

References:

1. Fundamentals of Reinforced concrete design by M.L. Gambhir, Printice Hall of India Private Ltd., New Delhi.
2. Design of concrete structures by J.N.Bandhyopadhyay PHI Learning Private Limited.
3. Design of Reinforced Concrete Structures by I.C.Syal and A.K.Goel, S.Chand & company.

Course Outcomes:

The student will be able to

3. Apply the different methods for design of Reinforced concrete structures.
4. Design the different types of beams and check for shear, torsion and bond.
5. Design the one way slab and two way slabs, and check for the serviceability.
6. Design different types of columns as per IS codes
7. Design different types of footings and staircases and detailing of reinforcement.

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B.Tech. CE	**L**	**T-P-D**	**C**
III Year - I Semester	**4**	**1-0-0**	**4**

(E311B) GEOTECHNICAL ENGINEERING-I

Course Objectives:

The student will

1. Understand the importance of Geotechnical Engineering and how it is applied in civil engineering
2. Understand the role of water in soil behavior and how soil stresses, permeability and quantity of seepage including flow net are estimated
3. Be provided with stress distribution in the soil due to different types of loading.
4. Understand estimation of compaction, magnitude and time-rate of settlement due to consolidation.
5. Understand the shear strength of soil.

UNIT–I:

Introduction: Soil formation - soil structure and clay mineralogy - Adsorbed water - Mass-volume relationship - Relative density. Index properties of soils: Grain size analysis - Sieve and Hydrometer methods - consistency limits and indices - I.S. Classification of soils.

UNIT–II:

Permeability: Soil water - capillary rise - flow of water through soils - Darcy-s law-permeability - Factors affecting - laboratory determination of coefficient of permeability Permeability of layered systems – Insitu permeability tests (Pumping in & Out tests) Effective stress: Total, neutral and effective stresses – Principle of effective stress - quick sand condition - Seepage through soils - Flow nets: Characteristics and Uses.

UNIT–III:

Stress distribution in soils: Boussinesqss and Westerguards theories for point loads, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical plane and horizontal plane, and - Newmark-s influence chart for irregular areas.

UNIT–IV:

Compaction: Mechanism of compaction - factors affecting - effects of compaction on soil properties. - Field compaction Equipment - compaction quality control. Consolidation: Immediate settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log p curves –normally consolidated soil, over consolidated soil and under consolidated soil – pre consolidation pressure and its determination – Terzaghis 1-D consolidation theory.

UNIT-V:

Shear strength of soils : Importance of shear strength –Mohr's - Coulomb Failure theories - Types of laboratory strength tests - strength tests based on drainage conditions - Shear strength of sands and clays – Critical Void Ratio - Liquefaction.

Text Books:

1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt . Ltd, New Delhi
2. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.

References:

1. Geotechnical Engineering by Purushotham Raj
2. Geotechnical Engineering by Manoj Dutta & Gulati S.K - Tata Mc.Grawhill Publishers New Delhi.
3. Soil mechanics by B.Das

Course Outcomes:

The student will be able to

1. Carry out soil classification
2. Solve the role of water in soil behavior.
3. Solve any practical problems related to soil stresses estimation
4. Estimate the compaction and consolidation of soil
5. Solve practical problems related to shear strength of soil

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B.Tech. CE	**L**	**T-P-D**	**C**
III Year - I Semester	**4**	**1-0-0**	**4**

(E311C) WATER RESOURCES ENGINEERING –I

Course Objectives:

The student will

1. Study about the hydrology and its applications, rainfall measurements, computation of average rainfall, empirical formulas and rational methods.
2. Study on flood hydrograph, effective rainfall, base flow, unit hydrograph and direct runoff.
3. Study on ground water occurrence, types of aquifers, Darcy's law and well hydraulics.
4. Study on necessity and importance of irrigation.
5. Study on classification of canals design of irrigation canals using IS standards.

UNIT–I:

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 - Adjustment of record -Rainfall Double Mass Curve. Runoff- Factors affecting Runoff – Runoff over a Catchment- Empirical and Rational Formulae.

Abstraction from rainfall-evaporation, factors affecting evaporation, measurement of evaporation- Evapo transpiration- Penman and Blaney & Criddle Methods -Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices.

UNIT–II:

Distribution of Runoff – Hydrograph Analysis Flood Hydrograph – Effective Rainfall – Base Flow- Base Flow Separation - Direct Runoff Hydrograph Unit pulse and Unit step function - Unit Hydrograph, definition, limitations and applications of Unit hydrograph, derivation of Unit Hydrograph from Direct Runoff Hydrograph and vice versa - S-hydrograph, Synthetic Unit Hydrograph.

UNIT–III:

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. Types of wells - Well Construction – Well Development.

UNIT–IV:

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 –Crop Rotation, preparation of land for Irrigation, standards of quality for Irrigation water.

Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, Duty and delta, factors affecting duty- Design discharge for a water course. Depth and frequency of Irrigation, irrigation efficiencies-Water Logging.

UNIT-V:

Classification of canals, Design of Irrigation canals by Kennedy's and Lacey's theories, balancing depth of cutting, IS standards for a canal design canal lining.

Design Discharge over a catchment, Computation of design discharge-rational formulae etc.

Text Books:

1. Engineering Hydrology by Jayaram Reddy, Laxmi publications pvt. Ltd., New Delhi
2. Irrigation and water power engineering by Punmia & Lal, Laxmi publications pvt. Ltd., New Delhi

References:

1. Elementary hydrology by V.P.Singh, PHI publications.
2. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House.
3. Irrigation Water Management by D.K. Majundar, Printice Hall of India.
4. Irrigation and Hydraulic structures by S.K.Grag - Khanna publishers

Course Outcomes:

The student will be able to

1. Compute the average rainfall over a basin and understand the recording and non recording type rain guages and also to determine infiltration indices and runoff over a basin.
2. Construct the unit hydrograph and determine the peak flood discharge.
3. Determine the aquifer parameters and their discharge from wells.
4. Estimate consumptive use and determine the depth and frequency of irrigation water required for the given crop.
5. Design unlined canals by using Kennedy's and Lacey's theories.

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B.Tech. CE	**L**	**T-P-D**	**C**
III Year - I Semester	**0**	**0-3-0**	**2**

(E3101) SURVEYING LAB-II

Course Objectives:

The student will

1. Have the ability to apply knowledge of mathematics, science, and engineering to understand the measurement techniques and equipment used in land surveying.
2. Have the ability to use techniques, skills, and modern engineering tools necessary for engineering practice.
3. Study use of total station
4. Find position of stations using G.P.S
5. Study recent changes in survey procedures and equipment.

LIST OF EXPERIMENTS:

1. Determine of area using total station
2. Traversing using total station
3. Contouring using total station
4. Determination of remote height using total station
5. Stake out using total station
6. Distance, gradient, differential height between two inaccessible points using total station.
7. Curve settling using total station
8. Resection using total station
9. Setting out works for buildings and pipe lines
10. Finding position of stations using G.P.S

Course Outcomes:

The student will be able to

1. Gain knowledge of mathematics, science, and engineering to understand the measurement techniques and equipment used in land surveying.
2. Gain an appreciation of the need for lifelong learning through the discussion of recent changes in survey procedures and equipment.
3. able to understand use of techniques, skills, and modern engineering tools necessary for engineering practice.
4. Understand use of total station
5. Understand how to Find position of stations using G.P.S

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B.Tech. CE	**L**	**T-P-D**	**C**
III Year - I Semester	**0**	**0-3-0**	**2**

(E3102) GEOTECHNICAL ENGINEERING LAB

Course Objectives:

The student will

1. Provided with civil engineering basic knowledge to carry out field investigations and to identify soils in geotechnical engineering practice.
2. Educated in performing and interpreting laboratory tests for evaluating sub grade performance and for pavement design.
3. Acquiring the Knowledge of ability to perform laboratory tests needed to determine soil design parameters.
4. Provided with the design and conduct experiments as well as analyse and interpret data.
5. Knowledge of and ability to perform laboratory tests needed to determine soil design parameters.

LIST OF EXPERIMENTS:

1. Atterberg Limits (Liquid Limit, Plastic Limit)
2. a)Field density by core cutter method and
   b)Determination of Specific gravity of soil.
3. Field density by sand replacement method
4. Grain size distribution by sieve analysis
5. Permeability of soil by constant and variable head test methods
6. Standard Proctor's Compaction Test
7. California Bearing Ratio Test (CBR Test)
8. Determination of Coefficient of consolidation (square root time fitting method)
9. Unconfined compression test
10. Direct shear test
11. Vane shear test
12. Differential free swell index (DFSI) test

Course Outcomes:

The student will be able to

1. Demonstrate site specific field investigations including collection of soil Samples for testing and observation of behaviour/building damage.
2. Perform identify and classify soils based on standard geotechnical engineering practice.
3. Perform laboratory compaction and in-place density tests for fill quality control.
4. Evaluate unsoaked and soaked California Bearing Ratio (CBR) tests used to estimate subgrade behaviour during construction and beneath permanent structures.
5. Determine engineering properties of soils

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B.Tech. CE	**L**	**T-P-D**	**C**
III Year - I Semester	**0**	**0-2-0**	**1**

(E3103) EMPLOYABILITY SKILLS

Course Objectives:

The student will

1. Equip the students to gain Employability Skills and to have successful careers.
2. Enable them to use English Language in different socio cultural and Professional contexts.
3. Assist them to communicate their ideas relevantly and coherently in the Globalised environment.

LIST OF EXPERIMENTS:

LISTENING:

1. Listening Comprehension-
exercises • Active Listening

READING:

2. Reading Comprehension – 4 Passages
3. Book Review-Any text among the list prescribed by the Department
4. Cloze Test

SPEAKING:

5. Extempore • Ad Making
6. One Act Plays • Poster presentation
7. Public Speaking • Mock Interviews
8. Group Discussions • Assertiveness
9. Interpersonal skills

WRITING:

10. Team building

VOCABULARY :

11. Business Vocabulary

CREATIVITY :

12. Short Films • Leadership

Text Books:

1. Effective Technical Communication, M. Ashraf Rizvi, Tata Mc. Graw-Hill Publishing Company Ltd.
2. Enhancing Employability @ Soft Skills by Shalini Verma –Pearson.

Reference Books:

1. Communication Skills by Leena Sen, Prentice-Hall of India, 2005.

Course Outcomes:

The students will be able to :

1. Gain employment and function successfully in their careers.
2. Use English successfully in different socio-cultural and professional contexts
3. Communicate their ideas coherently in globalized situations**.**

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B.Tech. CE	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**1-0-0**	**4**

(E321A) DESIGN OF STEEL STRUCTURES

Course Objectives:

The student will

1. Understand The manufacturing process of steel, types of steel and their properties. and the salient features of Limit State Method of design of Steel structures.
2. Understand the various codal provisions given in IS.800. Connections in steel structures
3. Acquire the Knowledge on the behavior of steel structures under tension, compression and flexure.
4. Understand the design procedures as per IS 800, for tension, compression and bending members
5. Provided with the details of joints in steel structures and design detailing of bolted and welded joints in beams &other members

UNIT–I:

Materials-Manufacturing of iron and steel-type of structural steel-mechanical properties of steel-concepts of plasticity-yield strength-load and combinations-local buckling behaviour of steel-concepts of limit state design-limit state design strength deflection limits serviceability stability check Bolted connections-IS:800-2007 specifications-Design strength-efficiency of joint prying action-welded connections-type of welded joints specifications-design requirements-Eccentric connections.

UNIT–II:

Design of tension members-Design strength-Design procedure-splice-lug angles Design of compression members-buckling-slenderness ratio-Load carrying capacity-laced columns battened columns-splice-column base slab base-Gusseted base.

UNIT–III:

Design of beams-plastic moment-bending and shear strength/buckling-built up section laterally supported beams.

UNIT–IV:

Design of welded plate girder-elements-economical depth-design of main section connections between web and flange-design of bearing stiffener-intermediate stiffeners design of web splice and flange splice.

UNIT-V:

Design of Roof Trusses-Type of roof trusses-load on roof trusses-purlin design-Analysis and design Roof trusses-Design of connections

Text Books:

1. Limit State design of Steel Structures by S.K.Duggal, TMH, New Delhi.
2. Design of steel Structure by N.Subramanian, Oxford University Press.

References:

1. Design of Steel Structures by S.S.BhaviKatti(By limit state methos), IK International Publishing House Pvt.Limited.
2. Limit state Design of Steel Structure by Dr.V L Shaw, Structures Publications, Pune
3. IS.800:2007-Indian Code Practice for Construction in Steel.

Course Outcomes:

The student will be able to

1. Design the tension members and compression members. slab and gusset type column bases.
2. Design the bending members and built up beams.
3. Design of beam end joints.
4. Design a welded plate girder and various stiffeners.
5. Design the various components of roof trusses.

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B.Tech. CE	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**1-0-0**	**3**

(E221B) TRANSPORTATION ENGINEERING

Course Objectives:

The student will

1. Study about Highway development in India, Necessity for Highway planning, different road development plans.
2. Understand about the Classification of Road Network Pattern Highway alignment, Factor affecting Alignment, Engineering surveys, drawing and reports, roads project initiation need based planning.
3. study the concepts on geometric design element
4. Gain knowledge on Highway Geometric design,
5. Gain knowledge about airport and railway engineering.

UNIT–I:

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

UNIT–II:

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

UNIT–III:

Traffic engineering: Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies- Data Collection and Presentation-speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams. Traffic regulation and management: Road Traffic Signs – Types and Specifications – Road markings- Need for Road Markings-Types of Road Markings- Design of Traffic Signals –Webster Method –IRC Method.

UNIT–IV:

Intersection design: Types of Intersections – Conflicts at Intersections- Types of At-Grade Intersections- Channelization: Objectives –Traffic Islands and Design criteria-Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

UNIT-V:

Introduction to railway and airport engineering: Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve – Crossings and Turnouts. Factors affecting Selection of site for Airport – Aircraft Characteristics- Geometric Design of Runway- Computation of Runway length – Correction for runway length – Orientation of Runway – Wind Rose Diagram.

Text Books:

1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000).
2. Railway Engineering – A textbook of Transportation Engineering – S.P.chadula – S.Chand & Co. Ltd. – (2001).

References:

1. Principles of Transportation Engineering by Partha Chakroborty & Aminesh Das; Prentice Hall of India, New Delhi.
2. Transport planning and Traffic Engineering by Dr. L. R. Kadiyali 3. Airport Planning and Design- S.K.Khanna and Arora,Nemchand Bros.

Course Outcomes:

The student will be able to

1. Classify roads based on functional classification.
2. Apply the concepts on geometric design element
3. Demonstrate about the use of fundamental physics and mathematical knowledge in deriving geometric design equations
4. Exposure to the Plan surveys, preparation of survey forms and data collection from field for highway design
5. Understand the importance of airport and railway engineering

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B.Tech. CE	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**0-0-0**	**4**

(E321C) CONCRETE TECHNOLOGY

(Professional Elective-I)

Course Objectives:

The student will

1. be provided with basic knowledge on the properties of cement and different grades of cement. gain knowledge on types of admixtures, minerals, chemical admixtures and usage.
2. understand about the classification of aggregates and characteristics.
3. gain proper knowledge about behavior and properties of fresh concrete, factors effecting fresh properties
4. hardened concrete, elastic, creep and shrinkage properties of concrete. and testing of hardened concrete.
5. attain knowledge on mix design of concrete and its ingredients, special concretes.

UNIT–I:

CEMENT : Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrate cement – Test on physical properties – Different grades of cement. Admixtures : Types of admixtures – mineral and chemical admixtures.

UNIT–II:

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

UNIT–III:

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

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

UNIT–IV:

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 compression & tensile strength - Curing.

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

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 – BIS method of mix design.

SPECIAL CONCRETE: Introduction to Light weight concrete – Cellular concrete – No-fine concrete – High density concrete – Fibre reinforced concrete – Polymer concrete – High performance concrete – Self compacting concrete.

Text Books:

1. Properties of Concrete by A.M.Neville – Low priced Edition – 4th edition
2. Concrete Technology by M.S.Shetty. – S.Chand & Co. ; 2004

References:

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
2. Concrete Technology by A.R. Santha Kumar, Oxford university Press, New Delhi
3. Concrete: Micro structure, Properties and Materials – P.K.Mehta and J.M.Monteiro, Mc-Graw Hill Publishers

Course Outcomes:

The student will be able to

1. Acquire knowledge on the properties of concrete ingredients i.e. cement, sand and coarse aggregate.
2. Develop an advanced knowledge of the mechanical performance of cement-based materials and how it can be controlled. Apply usage of various chemical admixtures and mineral additives to design cement-based materials with tailor-made properties.
3. Develop perception on the effects of the rheology and early age properties of concrete on its long-term behavior.
4. Apply the usage of laboratory tests to characterize hardened concrete and its properties.
5. Acquire the knowledge on the mix design and engineering properties of special concretes such as high-performance concrete, self-compacting concrete, fibre reinforced concrete, etc.

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B.Tech. CE	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**0-0-0**	**4**

(E321D) AIR POLLUTION AND CONTROL
(Professional Elective-I)

Course Objectives:

The student will

1. Introduce students to basic concepts of pollution.
2. understand the causes of air pollution.
3. Study about the health related to air pollution.
4. Develop skills relevant to control of air pollution.
5. understand the quality of air.

UNIT–I: Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution- stationary and mobile sources

UNIT–II: Effects of Air pollutants on man, material and vegetation; Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT–III: Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like SO_x; NO_x; CO; HC etc., air-fuel ratio. Computation and Control of products of combustion. Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity; Influence of Meteorological phenomena on Air Quality-wind rose diagrams.

UNIT–IV: Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion. Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control.
Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT-V: General Methods of Control of NO_x and SO_x emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.
Air Quality Management – Monitoring of SPM, SO_x; NO_x and CO Emission Standards.

Text Books:

1. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
2. Air pollution by Wark and Warner.- Harper & Row, New York.

References:

1. Air pollution and control By K.V.S.G. Murali Krishna, Kaushal Publishers. Kakinada.

Course Outcomes:

The student will be able to

1. knowledge on the basic elements of causes and occurrence of the air pollution.
2. Have awareness on the different causes of the air pollution.
3. Have awareness about different health related problems caused due to air pollution.
4. Can able to develop concepts in controlling and prevention of air pollution.
5. analyse the air quality.

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UGC AUTONOMOUS

B.Tech. CE	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**0-0-0**	**4**

(E321E) GROUND WATER DEVELOPMENT AND MANAGEMENT

(Professional Elective-I)

Course Objectives:

The student will

1. Study on Ground Water Occurrence, ground water hydrological cycle, origin of ground water, rock Properties effecting ground water, vertical distribution of ground water, Aquifers, types of aquifers, porosity, Specific yield and specific retention.
2. Study on Ground water movement permeability, Darcy's law storage coefficient transmissivity derivation, ground water flow contour their application.
3. Study on Steady Ground water flow towards a well in confined and unconfined aquifers, Deputises and thermos equation. Yield of an open well Well interface and well test, and Recuperation Test.
4. Study on Unsteady flow towards a well, non-equilibrium equation, thesis solution, Jacob and chows Simplifications, Leaky aquifers and well Interference.
5. Learn groundwater management using advanced tools.

UNIT–I:

Ground Water Occurrence: Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention. Ground Water Movement: Permeability, Darcy‗s law, storage coefficient. Transmissivity, differential equation governing ground water flow in three dimensions derivation, ground water flow equation in polar coordinate system. Ground water flow contours their applications.

UNIT–II:

Steady groundwater flow towards a well in confined and unconfined aquifers – Dupuit‗s and Theisms equations, Assumptions, Formation constants, yield of an open well Well interface and well tests – Recuperation Test. Unsteady flow towards a well – Non equilibrium equations – Theis‗ solution – Jocob and Chow‗s simplifications, Leaky aquifers – Well Interference.

UNIT–III:

Surface and Subsurface Investigation: Surface methods of exploration – Electrical resistivity and Seismic refraction methods. Subsurface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications along with Case Studies in Subsurface Investigation. Artificial Recharge of Ground Water: Concept of artificial recharge – recharge methods, relative merits, Applications of GIS and remote sensing-Artificial Recharge of Ground water along with Case studies.

UNIT–IV:

Well Construction – Drilling Equipment used for Well Construction – Bore log – Interpretation of Log Data.

UNIT-V:

Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben-Herzberg relation, Shape of interface, control of seawater intrusion. Groundwater Basin Management: Concepts of conjunction use, Case studies

Text Books:

1. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
2. Groundwater by H.M.Raghunath, Wiley Eastern Ltd.

References:

1. Groundwater Hydrology by BOWER, John Wiley & sons.
2. Groundwater System Planning & Managemnet – R.Willes & W.W.G.Yeh, Printice Hall.
3. Applied Hydrogeology by C.W.Fetta, CBS Publishers & Distributers.

Course Outcomes:

The student will be able to

1. The student will be with ground water occurrence, ground water movement equations, surface & subsurface investigations , artificial recharge of ground water, well construction etc.,
2. Estimate aquifer parameters and yield of wells.
3. Determine the process of artificial recharge for increasing groundwater potential.
4. Take effective measures for controlling saline water intrusion.
5. Apply appropriate measures for groundwater management.

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III Year - II Semester	**4**	**0-0-0**	**4**

(E321F) WATERSHED MANAGEMENT

(Professional Elective-I)

Course Objectives:

The student will

1. Improvement and restoration of soil quality and thus, raising productivity rates.
2. Supply and securing of clean and sufficient drinking water for the population.
3. Improvement of infrastructure for storage, transport and agricultural marketing.
4. To manage the watershed for beneficial development activity like domestic water supply, irrigation, hydropower generation etc.
5. To minimize the risk of floods, droughts and landslides. develop rural areas in the region with plans for improving the economy of the regions.

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 watershed. 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.

UNIT–III:

Measures to control erosion: Contour techniques, Ploughing, furrowing, trenching, building, terracing, gully control, rock fill dams, brushwood dam, gabion. Water harvesting: Rainwater harvesting, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds, percolation tanks.

UNIT–IV:

Land management: Land use and land capability classification, management of forest, agricultural, grassland and wild land. Reclamation of saline and alkaline soils. 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.

UNIT-V:

Planning of watershed management activities, people participation, preparation of action plan, administrative requirements.

Text Books:

1. Watershed Management by JVS Murthy,-New Age International Publishers.
2. Water Resource Engineering by R.A wurbs and WP James,-Prentice Hall Publishers

References:

1. Land and Water Management by VVN Murthy,- Kalyani Publications.
2. Irrigation and Water Management by D.K.Majumdar, Printice Hall of India.

Course Outcomes:

The student will be able to

1. It understands different watershed behaviour.
2. It will able to interpret runoff data and quality erosion by using various modelling methods.
3. It understands land use classification and impact of land use changes on hydrological cycle parameters.
4. To manage the watershed for beneficial development activity like domestic water supply, irrigation, hydropower generation etc.
5. To minimize the risk of floods, droughts and landslides.

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III Year - II Semester	**4**	**1-0-0**	**4**

(E321G) GEO-TECHNICAL ENGINEERING – II

(Professional Elective-II)

Course Objectives:

The student will

1. Emphasize the importance of soil investigations including destructive and non-destructive methods.
2. Understand how earth pressure theory is important in the design of retaining structure.
3. Acquire the concept of bearing capacity and how to estimate the safe bearing capacity for various foundation systems including settlement consideration.
4. Gain knowledge about suitable shallow foundation system for various site conditions and also analysis of different foundation system.
5. Understand the circumstances when pile is needed and how do analysis the pile and pile group under various soil conditions.

UNIT–I:

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

UNIT–II:

Earth slope stability: Infinite and finite earth slopes, types of failures, factor of safety of infinite slopes, stability analysis by 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, Culmann‘s graphical method. Retaining walls: Types of retaining walls, stability of cantilever retaining walls.

UNIT–IV:

Shallow foundations: Types and choice of foundation, Location of depth, Safe Bearing Capacity by Terzaghi, Meyerhof, Skempton and IS Methods. Safe bearing pressure based on N value, allowable bearing pressure, safe bearing capacity and settlement from plate load test, allowable settlements of structures, Settlement Analysis.

UNIT-V:

Pile foundation: Types of piles, Load carrying capacity of piles based on static pile formulae, Dynamic pile formulae, Pile load tests, Load carrying capacity of pile groups in sands and clays, Settlement of pile groups. Well foundations: Types and Different shapes of wells, Components of wells, functions, Design Criteria, Sinking of wells, Tilts and shifts.

Text Books:

1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New Age International Pvt. Ltd, (2004).
2. Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.

References:

1 Das, B.M., - (1999) Principles of Foundation Engineering –6th edition (Indian edition) Thomson Engineering

2 Bowles, J.E., (1988) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing company, Newyork.

3 Analysis and Design of Substructures – Swami Saran, Oxford and IBH Publishing company Pvt Ltd (1998).

Course Outcomes:

The student will be able to

1 Carry out soil investigation for any civil engineering construction.

2 Analyse earth retaining structures for any kind of soil medium.

3 Estimate bearing capacity using IS code methods.

4 Design proper foundations for any kind of shallow foundation system.

5 Estimate pile and pile group capacity for any kind of soil including group efficiency and negative skin friction.

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III Year - II Semester	**4**	**1-0-0**	**4**

(E321H) URBAN DISASTER – INTELLIGENT CONTROL SYSTEM
(Professional Elective-II)

Course Objectives:

The student will

1. Classify the various types of disasters, understand the various terminologies.
2. Analyze the various causes of disasters (both natural and man-made) and their impacts.
3. Gain the knowledge of different monitoring profiles (engineering profile and planning profile) to track the urban disasters. And know the means to use the information systems like GIS, MIS in disaster control system.
4. Forecast the different approaches through decision supporting systems, online monitoring systems etc.
5. To understand the Intelligent transport systems for managing the traffic systems

UNIT–I: Disasters: Types of disaster, significant aspects of disasters, economic impact of disasters, Risk aspects, Hazards and disasters. Urban Disaster and their environmental impacts: Impact of earthquakes, floods, fires, droughts, landslides, Congestion pollution, accident risk on urban environment policies for remedial measures. Technology to forecast their impact.

UNIT–II: Technology to Track Urban Disasters: Monitoring profile – cameras, sensors and communication systems engineering profiles – total station, terrestrial scanners, and other survey equipment. Planning Profile – Impact on Urban Disasters: Planning profile – GPS, satellite technology and photographic technique

UNIT–III:

Information systems: Geography information systems – different packages and over view, MIS – Architecture, web enabled communication systems – over view.

UNIT–IV:

Intelligent control system: Technology enabled online monitoring system, post evaluation multi criteria systems, fore casting approaches through decision supporting systems.

UNIT-V: Intelligent transport systems- traffic signal control systems – Dynamic Traffic light sequence – inductive loop technologies – Video Vehicle Detection – Collision Avoidance Systems – Cooperative Systems on Roads – Container Management System. Disasters – case studies on disaster mitigation measures.

Text Books:

1. Disasters – Global challenges and local solutions by Rajib Shaw. R.R. Krishna Murthy, University Press.
2. Sensor Technologies & Date requirement of ITS by Lawerence A. Klein.

References:

1. Disaster mitigation – Experiences and reflections – Pradeep sahni, Alka Dhameja, Uma Medhuri, PHI.

Course Outcomes:

The student will be able to

1. Identify the various disasters and grouping them.
2. Identify the disasters and their impacts in the urban society and forecast the important disasters using various technologies.
3. Enable to learn some technical skills and software packages for monitoring the disasters management.
4. Can able to learn online monitoring with respect to the post evaluation criteria.
5. Can able to learn various controlling systems and disaster mitigation measures

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UGC AUTONOMOUS

B.Tech. CE	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**1-0-0**	**4**

(E321I) SOLID WASTE MANAGEMENT
(Professional Elective-II)

Course Objectives:

The student will

1. The main objectives of this course are to provide in depth knowledge about handling of solid waste from cradle to grave.
2. It also provides the knowledge of designing and constructing the solid waste treatment system.
3. Provides the residue disposed of in an environmentally sound way.
4. Provides students depth knowledge in waste minimization.
5. provides knowledge in design and maintenance of different units

UNIT–I:

Introduction to Municipal Solid Waste Definition – Sources and impact of solid waste on environment ,Classification of solid waste –composition and its determinants of Solid waste –factors influencing generation quality assessment of solid waste –methods of sampling and characterization.

UNIT–II:

Collection : collection of Solid waste –collection services –collection system ,equipments – time and frequency of collection –labour requirement –factors affecting collection –analysis of collection system –collection routes –preparation of master schedules . Transfer and Transport: Need for transfer operation- transfer stations-types-transport means and methods location of transport stations - collection routes: transfer stations selection of location, Design requirements, operation and maintenance

UNIT–III:

Waste processing and reuse Processing technologies: Biological, chemical conversation technologies and thermal conversion technologies. Reuse of solid waste energy recovery – incineration- solidification and stabilization of hazardous waste- treatment of biomedical wastes

UNIT–IV:

Waste disposal techniques Introduction, composting, principles of composting, factors affecting composting, vermin composting, waste to energy technique- Landfill technique and design and operating procedure of landfill

UNIT-V:

Solid waste management techniques Solid waste manangement Hierarchy, waste avoidance / waste prevention, Defination of source reduction, waste reduction at source using 5r‘s Technique, solid waste management rules and regulations

Text Books:

1. A.D. Bhide and B.B.Sundaresan, —Solid waste management-Collection,Processing and disposal‖, Mudrashilpa offset printers,Nagpur, 1st edition, 2001
2. Techobanoglous Thiesssen Ellasen, — Solid Waste Engineering Principles and Management‖, McGraw-Hill 1997.126

References:

1. K. Sasi Kumar & S.Gopi Krishna, —Solid Waste Management‖.
2. Tchobanoglous, Theissen & Vigil, —Integrated Solid Waste Management‖, McGraw Hill Publication, 1st Edition, 1997.
3. R.E.Landrefh and P.A.Rebers, —Municipal Solid Wastes-Problems & Solutions‖, Lewis Publications, 1st edition,1997

Course Outcomes:

The student will be able to

1. Understand the components of solid waste management and the laws governing it.
2. Acquires the knowledge of design, operation and maintenance of landfills, incinerators and composting units.
3. Reducing the amount and toxicity of material entering the waste flow (minimization).
4. Reusing as much material as practicable.
5. Recycling the waste that cannot be used and recovery of resources.

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B.Tech. CE	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**1-0-0**	**4**

(E321J) FEM FOR CIVIL ENGINEERING
(Professional Elective-II)

Course Objectives:

The student will

1. provide the fundamental concepts of the theory of the finite element methods and proficiency in the application of finite element method to realistic engineering problems.
2. study the element shapes, nodes, and nodal degree of freedom.
3. To perform 1-D and 2-D structural analysis using finite element methods.
4. To understand the elemental nodal procedure such as CST, Lagrange, Serendipity elements.
5. To understand the use of the basic finite elements for structural applications for 4-node Isoperimetric, Axisymmetric element, and study the solution techniques for static loads.

UNIT–I:

Introduction: Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation. Principles of Elasticity: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axisymmetric bodies of revolution with Axisymmetric loading.

UNIT–II:

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

UNIT–III:

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 – area and volume coordinates.

UNIT–IV:

Generation of element stiffness and nodal load matrices for 3-node triangular element and four node rectangular elements. Isoparametric formulation: Concepts of isoperimetric elements for 2D analysis formulation of CST element, 4 –noded and 8-noded isoparametric quadrilateral elements – Lagrangian and Serendipity elements. the elemental nodal procedure such as CST, Lgrangian, Serendipity elements.

UNIT-V:

Axisymmetric analysis: Basic Principles-Formulation of 4-node Isoparametric Axisymmetric element. Solution techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

Text Books:

1. Finite Elements Methods in Engineering by Tirupati.R. Chandrepatla and Ashok D. Belegundu - Pearson Education Publications.
2. Finite element analysis by S.S. Bhavakatti-New age international publishers.

References:

1. Concepts and Applications of Finite Element Analysis by Robert D.Cook, David S. Malkus and Michael E.Plesha. Jhon Wiley & Sons.
2. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers.
3. Text book of finite element analysis by P.Seshu – Prentice Hall of India.

Course Outcomes:

The student will be able to

1. Develop a basic understanding of the limitations of FEM and understand the possible error sources in its use.
2. Develop element characteristic equation procedure and generation of global stiffness equation will be applied.
3. An ability to derive equations in finite element methods for 1D and 2D problems.
4. An ability to formulate and solve basic problems in structural mechanics using different elements.
5. An ability to apply knowledge of mathematics to model engineering systems.

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B.Tech. CE	**L**	**T-P-D**	**C**
III Year - II Semester	**0**	**0-3-0**	**2**

(E3201) TRANSPORTATION ENGINEERING LAB

Course Objectives:

The student will

1. gain the practical knowledge of properties of highway materials and surveys.
2. learn the procedure of testing bituminous material as per standard code recommendations.
3. relate the material characteristic to various application of construction.
4. bitumen and & its engineering behavior
5. concept of traffic behavior

LIST OF EXPERIMENTS:

I. ROAD AGGREGATES:

1. Aggregate Crushing Value Test
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption Test
4. Los Angeles Abrasion Value Test
5. Flakiness and elongation Indices of coarse Aggregates.

II. BITUMINOUS MATERIALS:

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Marshal stability Test

III. TRAFFIC STUDIES

1. Traffic volume Counts-Mid Blocks
2. Traffic volume Counts-Junctions
3. Spot speed studies.
4. Parking Studies

Course Outcomes:

The student will be able to

1. practically student can provide or identify properties of highway materials.
2. exposure to a variety of established material testing techniques.
3. identify engineering properties of aggregate.
4. find out peak hour traffic & peak time for a given location on the road.
5. calculate design speed, maximum speed & minimum speed limits of a location through spot speed.

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B.Tech. CE	**L**	**T-P-D**	**C**
III Year - II Semester	**0**	**0-3-0**	**2**

(E3202) CONCRETE TECHNOLOGY LAB

Course Objectives:

The student will

1. understand the test procedures to find physical properties of cement.
2. understand test procedures to find specific gravity, bulking of aggregates.
3. study test procedures to find properties of fresh concrete.
4. study the test procedures to find properties of hardened concrete.
5. study the non destructive test of concrete with advanced equipment.

LIST OF EXPERIMENTS

EXPERIMENT 1: Fineness of cement.

EXPERIMENT 2: Initial setting time and final setting time of cement.

EXPERIMENT 3: Specific gravity of cement .

EXPERIMENT 4: Soundness of cement.

EXPERIMENT 5: Compressive strength of cement.

EXPERIMENT 6: Workability test on concrete by compaction factor

EXPERIMENT 7: Workability test on concrete by slump cone test.

EXPERIMENT 8: Workability test on concrete by Vee-bee consistometer.

EXPERIMENT 9: Young's modulus of concrete.

EXPERIMENT 10: Compressive strength of concrete.

EXPERIMENT 11: Bulking of sand.

EXPERIMENT 12: Non-Destructive testing on concrete 1(for demonstration).

Course Outcomes:

The student will be able to

1. test fineness, specific gravity, setting time, soundness and compressive strength of cement.
2. test specific gravity of coarse aggregate and fine aggregate, bulking of fine aggregate.
3. design concrete mix proportioning by using indian standard method.
4. test workability of fresh concrete and compressive strength, split tensile strength of hardened concrete.
5. identify the difference between coarse aggregates and fine aggregates, strength aspects etc.

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B.Tech. CE	**L**	**T-P-D**	**C**
III Year - II Semester	**0**	**0-3-0**	**2**

(E3203) COMPUTER AIDED DRAFTING LAB –II

Course Objectives:

The student will

1. To make student understand detailing of all kinds of structures might be of reinforced concrete , plain concrete , steel structures
2. To know how to apply engineering drawing using computers
3. Describe the significance of structural software and its main features.
4. Able to do Detailing of RC elements using AUTO CAD
5. To understand the general concepts of engineering drawing and general principles on a CAD

LIST OF EXPERIMENTS

1. Detailing of reinforcement in Cantilever, Simply supported and Continuous Beams (Both Singly & Doubly Reinforced Beams)
2. Detailing of reinforcement in canopy & columns (both uniaxial & biaxial)
3. Detailing of reinforcement in RC isolated footings square, rectangular, circular and combined footings.
4. Detailing of reinforcement in RC one-way, two-way slabs and dog-legged staircases.
5. Drawing of Steel bolted and welded connections.
6. Drawing of steel compression and tension members.
7. Drafting of steel beams-built-up sections.
8. Drafting of steel plate girder
9. Drafting of steel roof truss.

Note: Drafting of all the exercises is to be carried out using commercially available drafting softwares.

Course Outcomes:

The student will be able to

1. Draft various structures
2. Able to know how to apply engineering drawing using computers
3. Draw the structural elements like beam, frame
4. Draw Detailing of RC elements using AUTO CAD.
5. To draft the plan, elevation and sectional views of the buildings, industrial structures, framed buildings using AUTO CAD

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**1-0-0**	**4**

(E411C)ADVANCED FOUNDATION ENGINEERING
(Professional Elective-III)

Course Objectives:

The student will

1. Emphasize the importance of soil investigations including destructive and non-destructive methods.
2. Understand how earth pressure theory is important in the design of retaining structure.
3. Acquire the concept of bearing capacity and how to estimate the safe bearing capacity for various foundation systems including settlement consideration.
4. Gain knowledge about suitable shallow foundation system for various site conditions and analysis of different foundation system.
5. Understand the circumstances when pile is needed and to understand the need of analysis of pile and pile group under various soil conditions.

UNIT - I:

SHALLOW FOUNDATIONS-I: 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.

SHALLOW FOUNDATIONS-II: 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.

DEEP FOUNDATIONS-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.

UNIT - III:

DEEP FOUNDATIONS – II: Well foundations – elements of well foundation, Forces acting a 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 - IV:

SHEET PILE WALLS: Cantilever sheet piles and anchored bulkheads, Earth Pressure diagram, Determination of depth of embedment in sands and clays, Timbering of Trenches, Earth Pressure Diagrams, Forces in struts.

UNIT - V:

FOUNDATIONS IN PROBLEMATIC SOILS: Foundations in black cotton soils, foundation problems associated with black cotton soils, Lime column techniques-Principles and execution, (CNS) layer concept.

DESIGN OF UNDER REAMED PILES FOUNDATIONS: Under reamed piles-principle of functioning of under reamed pile, Analysis and structural design of under reamed pile.

Text Books:

1. Analysis and Design of Foundations and Retaining Structures Shamsher Prakash, Gopal Ranjan and Swami Saran.
2. Foundation Design-Teng.

Reference Books:

1. Analysis and Design of Foundations – E.W. Bowles.
2. Foundation engineering by Brije.M.Das, Cengage publications, New Delhi.
3. Foundations Design and Construction – Tomlinson.

Course Outcomes:

The student will be able to

1. Carry out soil investigation for any civil engineering construction.
2. Analyse earth retaining structures for any kind of soil medium.
3. Estimate bearing capacity using IS code methods.
4. Design proper foundations for any kind of shallow foundation system.
5. Estimate pile and pile group capacity for any kind of soil including group efficiency and negative skin friction.

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**1-0-0**	**4**

(E411D)TRAFFIC ENGINEERING

(Professional Elective-III)

Course Objectives:

The student will

1. Study the importance of traffic characteristics and different methods of traffic Surveys
2. Study about highway capacity and the factors affecting it, traffic flow
3. Study about parking studies
4. Know about traffic control and regulations
5. Study about traffic signs, road markings and road accidents

UNIT - I:

Traffic Characteristics

Basic characteristics of Traffic- Volume, Speed and Density- Relationship among Traffic parameters.

Traffic Surveys

Traffic Volume Studies-Objectives- Types of Volume Studies –Concept of PCU- Data Collection and Presentation – Speed Studies – Types of Speed studies – Objectives of Speed Studies- Methods of Conducting speed studies- Data collection and Presentation-Statistical Methods for Analysis of Speed Data.

UNIT – II:

Highway Capacity

Definition of Capacity – Importance of capacity – Concept of Level of Service - Different Levels of Service- Factors affecting Capacity and level of service

Theory of Traffic Flow

Definition of traffic flow-relationship between the variables-fundamental diagram of traffic flow-linear relationship between speed and concentration

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 Storey 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- Traffic Signals- Saturation Flow – Signal Design by Webster Method – Signal Phasing and Timing Diagrams.

Traffic and Environment

Detrimental effect of traffic on environment – Air Pollution – Pollutants due to Traffic – Measures to reduce Air Pollution - Noise Pollution – Measures to reduce Noise Pollution

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.

Highway Safety

Road accidents – Types of Road accidents- Causes – Engineering Measures to reduce Accidents- Enforcement Measures – Educational Measures- Road Safety Audit- Principles of Road Safety Audit.

Text Books:

1. Traffic Engineering and Transportation planning – L.R kadiyali – Khanna publishers.
2. Fundamentals of Transportation Engineering – C.S. Papacostas, Prentice Hall (India).

Reference Books:

1. Transportation Engineering – An Introduction – C. J. Khisty, Prentice Hall of India.
2. Principles of Transportation Engineering – Partha Chakroborthy, Animesh Das – Prentice Hall of India.
3. Highway Engineering and Traffic Analysis-Mannering and Kilareski, John wiley Publications.

Course Outcomes:

The student will be able to

1. Understand the Basic characteristics of Traffic
2. Analyse highway capacity and design traffic flow pattern
3. Know different types parking
4. Design signals by Webster method
5. Carry out surveys involved in traffic control

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**1-0-0**	**4**

(E411E)BRIDGE ENGINEERING
(Professional Elective-III)

Course Objectives:

The student will

1. Study different types of bridges, forces that act on bridges, Design of bridge and its elements
2. Learn the hydraulic, geological and geo-technical aspects in bridge design.
3. Study about the detail the bridge deck and box girder systems, steel and composite bridges.
4. Study about the sub-structures, bridge bearings and various long span bridges.
5. Study about the Bearings, joints, types of foundation.

UNIT I:

Introduction: Types of bridges - Materials of construction - Codes of practice (Railway and Highway Bridges) - Aesthetics - Loading standards (IRC, RDSO, AASHTO) – Recent developments box girder bridges - Historical bridges (in India and overseas). Planning and layout of bridges: Hydraulic design - Geological and geotechnical considerations - Design aids - Computer software- Expert systems.

UNIT II:

Design Consideration for R. C. C. Bridges:

Various types of R.C.C. bridges (brief description of each type), design of R.C.C. culvert and T-beam bridges.

UNIT III:

Design Consideration for Steel Bridges:

Various types of steel bridges (brief description of each), design of truss and plate girder bridges.

UNIT IV:

Sub-structure: Piers - Columns and towers - Analysis and design – Shallow and deep foundations - Caissons - Abutments and retaining walls. Bridge appurtenances: Expansion joints - Design of joints - Types and functions of bearings - Design of elastomeric bearings - Railings - Drainage system - Lighting.

UNIT V:

Long span bridges: Design principles of continuous box girders – Curved and skew bridges – Cable stayed and suspension bridges – Seismic resistant design - Seismic isolation and damping devices.

Construction techniques: Cast in-situ - Prefabricated – Incremental launching - Free cantilever construction - Inspection - Maintenance and rehabilitation - Current design and construction practices.

Text Books:

1. Essentials of Bridge Engineering, D.J. Victor, Oxford & IBH Publications, New Delhi
2. Design of Bridges, N Krishna Raju, Oxford & IBH, New Delhi.
3. Bridge Deck Analysis, R.P. Pama & A.R Cusens, John Wiley & Sons.

Reference Books:

1. Design of Bridge Structures, T.R. Jagadish & M.A. Jairam, Prentice Hall of India, New Delhi.

Course Outcomes:

The student will be able to

1. Understand the fundamentals and codes of practice of bridge design.
2. Design the bridge deck and box girder systems using appropriate method.
3. Devise the steel truss and composite steel-concrete bridges.
4. Propose the sub-structure components such as pier, abutments, etc. and bridge bearings.
5. Design the various types of long span bridges, curved and skew bridges.

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E411F) WATER RESOURSES ENGINEERING – II
(Professional Elective-III)

Course Objectives:

The student will

1. Build on students' background in hydrology and hydraulics.
2. Understand water resources systems and various channel systems.
3. Develop the skills in modelling of dams and spillways.
4. Develop skills in diversion headworks and storage reservoirs.
5. Provide the knowledge in the design of reservoirs, dams and canals operations.

UNIT - I:

Storage works reservoirs: Types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, and estimation of capacity of a reservoir using mass curve- reservoir sedimentation-life of reservoir-types of dams, factors affecting the selection of type and site of a dam.

UNIT - II:

Gravity dams: Forces acting on a gravity dam, causes of failure of Gravity dam, elementary profile and practical profile of the gravity dam, limiting height of a low gravity dam, factors of safety- stability analysis, foundation of a gravity dam, drainage and inspection galleries.

UNIT - III:

Earth dams: Types of earth dams, causes of failure of an earth dam, criteria for safe design of earth dam, seepage through earth dam (graphical method), measures for control of seepage.

Spillways: Types of spillways, design principles of ogee spillway-spillway gates. Energy dissipaters and stilling basins, significance of hydraulic jump, high curve and tail water rating curve-United States Bureau of Reclamation (USBR) and Indian types of stilling basins.

UNIT - IV:

Diversion headworks: Types of diversion headworks-weirs and barrages, layout of diversion headworks-components, Causes of failure of weirs and barrages in permeable foundations-silt ejectors and silt excluders, weirs on permeable foundations-creep theory-Bligh's, Lane's and Khosla's theories, Determination of uplift pressure-various correction factors- design principles of weirs on permeable foundations using creep theory-exit gradient, upstream and downstream sheet piles-launching apron.

UNIT - V:

Canal falls: Types of falls and their location, design principles of notch fall and Sarada type fall. Canal regulation works, design principles of distributor and head regulators, canal cross regulators-canal outlets, types of canal modules, proportionality sensitivity and flexibility.

Cross drainage works: Selection of site, design principles for an aqueduct, siphon aqueduct and super passage. Design of under tunnel aqueduct

Text Books:

1. Irrigation and Water Power Engineering by B.C. PUNMIA, standard publishers 2001.
2. Hydrology by Ragunath.H.M, Willey,Eastern limited New Delhi 2000.

Reference Books:

1. Irrigation and water resources and water power by PN MODI standard book house.
2. Irrigation water management by DK Majundar,Printice hall of Indra.

Course Outcomes:

The student will be able to

1. Design various channel systems.
2. Identify various types of reservoirs and their design aspects.
3. Acquire knowledge about cross drainage works and their design.
4. Design different types of canal falls.
5. Design head and cross regulator structures.

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E411G) EARTH AND ROCK FILL DAMS AND SLOPE STABILITY
(Professional Elective - IV)

Course Objectives:

The student will

1. Introduce the various seismic design concepts and current practices for earth dams
2. Understand the importance of failure, damages and protection of earth dams.
3. Study slope stability analysis and types of failures.
4. Apply different methods of slope stability.
5. Understand the requirements of rock fill dams..

UNIT - I:

Earth and rock fill dams: general features, selection of site; merits and demerits of the earth and rock fill dams, classification of earth dams, causes of failure, safe design criteria, instrumentation in earth dams: pore pressure measurements, settlement gauges, inclinometers, stress measurements, seismic measurements

UNIT - II:

Failures, damages and protection of earth dams: nature and importance of failure, piping through embankment and foundations, methods of seepage control through embankments and foundations, design criteria for filters, treatments of upstream and downstream of slopes, drainage control fitter design.

UNIT - III:

Slope stability analysis: Types of failure: Failure surface, planar surfaces, Circular surfaces, non-circular surfaces, limit equilibrium methods, total stress analysis versus effective stress analysis, use of hop's pore pressure parameters, short term and long-term stability in slopes, Taylor charts

UNIT - IV:

Methods of slope stability methods: methods of slices, effect of cracks, vertical cuts, Bishops analysis, Bishops and Morgenstern analysis, non-circular failure surfaces, Janb analysis, slider analysis, seismic stability, stabilization of slopes: slopes reinforcement and photosynthetic/soil nailing/micro piles ectasia treatment(cement time/lime treatment), surface protection(Vegetation/shotcrete)

UNIT - V:

Rock fill dams: Requirements of compacted rockfill, shear strength of rockfill mixtures, rockfill embankments, earth core rock fill dams, stability upstream and downstream slopes

Text Books:

1. Sherard, Woodward, zienski and Clevenger. Earth and earth rock dams. John Wiley sons 1963.
2. Bharat Singh and Sharma-D -Earth and rock fill Dams ,1999.

Reference Books:

1. Sowers, gf and sashay, h.d Earth and rock fill Dams, Williams, R.C and Venice, TS 1965
2. Abramson, L H Lee, S.N Sharma, S. -slope stability and stabilisation methods john Wiley and sons. (2002)

Course Outcomes:

The student will be able to

1. Carry out soil investigation for any civil engineering construction.
2. Analyse earth retaining structures for any kind of soil medium.
3. Estimate bearing capacity using IS code methods.
4. Select an appropriate slope stability analysis method subject to geometry of slope, material properties, and uncertainty of observations.
5. Assess the potential landslide risk of slopes.

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E411H) SOIL DYNAMICS AND MACHINE FOUNDATIONS
(Professional Elective - IV)

Course Objectives:

The student will

1. study the fundamentals of vibration, wave propagation and dynamic soil properties. vibration analysis.
2. study about the behavior and properties/response of soil as a material which is subjected to various types of dynamic or cyclic time- dependent loadings.
3. study the behavior of various geotechnical structures such as shallow and deep foundations, retaining structures due to various types of time-dependent dynamic loading
4. study the design of machine foundations
5. study about machine foundations on piles

UNIT - I:

Fundamentals of Vibration: Definitions, Simple harmonic motion, Response of Single Degree of Freedom (SDOF) systems of Free and Forced vibrations with and without viscous damping, Frequency dependent excitation, Systems under transient loads, Rayleigh's method of fundamental frequency, Logarithmic decrement, Determination of viscous damping, Transmissibility, Systems with Two and Multiple degrees of freedom, Vibration measuring instruments.

UNIT - II:

Wave Propagation and Dynamic Soil Properties: Propagation of seismic waves in soil deposits - Attenuation of stress waves, Stress-strain behavior of cyclically loaded soils, Strength of cyclically loaded soils, Dynamic soil properties - Laboratory and field-testing techniques, Elastic constants of soils, Correlations for shear modulus and damping ratio in sand, gravels, clays and lightly cemented sand. Liquefaction of soils: An introduction and evaluation using simple methods.

UNIT - III:

Vibration Analysis: Types of vibration analysis, General Requirements, Permissible amplitude, Allowable soil pressure, Modes of vibration of a rigid foundation block, Methods of analysis, Lumped Mass models, elastic half space method, elastic-dynamics, effect of footing shape on vibratory response, dynamic response of embedded block foundation, Vibration isolation.

UNIT - IV:

Design of Machine Foundations: Analysis and design of block foundations for reciprocating engines, Dynamic analysis and design procedure for a hammer foundation, IS code of practice, design procedure for foundations of reciprocating and impact type machines. Vibration isolation and absorption techniques.

UNIT - V:

Machine Foundations on Piles: Introduction, Analysis of piles under vertical vibrations, Analysis of piles under translation and rocking, Analysis of piles under torsion, Design procedure for a pile supported machine foundation.

Text Books:

1. Das, B. M. - Principles of Soil Dynamics, PWS KENT publishing Company, Boston.
2. I Chowdhary and S P Dasgupta - Dynamics of Structures and Foundation, 2009.

References:

1. Arya, S. D, O'Neil, M. and Pincus, G.- Design of Structures and Foundations for Vibrating Machines, Gulf Publishing Co., 1979.
2. Prakash, S. and Puri, V. K. - Foundation for Machines: Analysis and Design, John Wiley & Sons, 1998.
3. Prakash, S. - Soil Dynamics, McGraw Hill, 1981.

Course Outcomes:

The student will be able to

1. Apply the theory of vibrations to solve dynamic soil problems.
2. Calculate the dynamic properties of soils using laboratory and field tests.
3. Analyze and design the behavior of a machine foundation resting on the surface, embedded foundation and foundations on piles.
4. Understand the Design of Machine Foundations
5. Understand about Machine Foundations on Piles

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E411I) PAVEMENT DESIGN
(Professional Elective-IV)

Course Objectives:

The student will

1. Factors Affecting Pavement Design
2. Stresses induced in flexible and rigid Pavements
3. Properties of aggregate, bitumen and bituminous mixes
4. Various design methods of flexible and rigid Pavements
5. Construction of pavements and their maintenance

UNIT - I:

Introduction to pavement design: Variables considered in Pavement Design-Types of Pavements-Functions of individual layers-Factors affecting Pavement Design-wheel loads-Tire Pressure-Contact Pressure-Equivalent standard axle load (EAL) and Equivalent single wheel load (ESWL) concepts-Traffic Analysis- Average daily traffic (ADT) and Annual average daily traffic (AADT).

UNIT - II:

Stresses in flexible and rigid pavements: Stresses in Flexible Pavements-Layered systems concept-One-layer system-Boussinesq's two-layer system-Burmister's theory of Pavement design.

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 - III:

Material characteristics: Tests on aggregates-Aggregate properties and their importance-Tests on Bitumen-requirements of design mix-Marshall method of mix design.

UNIT - IV:

Flexible and rigid pavement design: Flexible Pavement Design concepts, Flexible Pavement design methods- CBR method, IRC method, Asphalt Institute method and American association of state highway and transportation officials (AASHTO) method.

Rigid Pavement design concepts-IRC method of Rigid pavement design-Importance of Joints in rigid Pavements-Types of joints - Design of tie bars and dowel bars.

UNIT - V:

Highway construction and maintenance: Construction: Construction of Bituminous Pavements construction of Cement Concrete Roads-Soil Stabilization-use of Geosynthetics.

Highway maintenance –Pavement failures-failures in flexible Pavements-Rigid Pavement failures-Pavement evaluation-Benkelman Beam method.

Text Books:

1.Highway Engineering-S.K. Khanna & C.J. Justo, Nemchand & Bros.

2.Principles & Practices of Highway Engineering-Dr L.R.Kadiyali & Dr.N.B Lal, Khanna Publishers.

Reference Books:

1. Principles of Pavement design, Yoder.& Witzorac Mathew, John Wiley & Sons Inc.
2. Pavement Analysis and Design, Yang H. Huang, Prentice Hall Inc.
3. IRC codes for Design of Flexible and Rigid Pavements.

Course Outcomes:

The student will be able to

1. understand and analyse the factors considered in pavement design
2. analyse stresses induced in flexible and rigid pavements
3. know properties of aggregate, bitumen and bituminous mixes
4. design flexible and rigid pavement by various methods
5. understand the construction of pavements and their maintenance

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E411J) CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT
(Professional Elective-IV)

Course Objectives:

The student will

1. Study Fundamentals of construction technology, Construction Records, Documents, Quality, safety.
2. Study on Construction methods, earthwork, piling, concrete and concreting, formwork, Fabrication and Erection. Excavators, rollers, Dozer Scrapers, handling equipment, concrete.
3. Equipment, handling equipment, cranes draglines and Clamshells.
4. Study on Quality control, Contract Management, Construction Planning
5. Study on Project Scheduling, PERT, CPM Resources leveling.

UNIT - I:

Fundamentals of Construction Technology – Construction Activities, Process Construction Schedule –Construction Records – Documents - Codes and Regulations.

UNIT - II:

Construction Method – Earthwork, excavators, rollers, doers, Scrapers, Piling.
Handling Equipment – Draglines and Clamshells, cranes. Concrete Equipment– Concrete and Concreting – Form work – Fabrication and Erection. Mechanized Construction.

UNIT - III:

Quality and Safety-Quality Control, Assurance and Safety – ISO – 9000 Quality system.
Precaution on Safety – Personnel, Fire and-Electrical Safety
Environment Protection – Concept of Green Building. Air conditioned and HVAC systems.

UNIT - IV:

Contract Management – Project Estimation, Types of Estimation, Contract Document Classification, Bidding, Procurement Process.
Construction Claims, Dispute and Project Closure, Source of Claim, Construction Closure, Contract Closure, Claim Management, Dispute Resolution, Arbitration – Documentation.

UNIT - V:

Construction Planning – Project Planning Techniques – Planning of manpower, Equipment Economics- Finance. Project – PERT – CPM, Resource leveling.

Text Books:

1. Saurabh Kumar Soni “Construction Management and Equipment” S.K. Kataia and Sons publishers.
2. Dr. Seetharaman “Construction Engineering and Management” Umesh publications 5th edition.

Reference Books:

1. Subir K.Sarkar Nad Subhajit Saraswati " Construction Technology" Oxford University Press 2009
2. B.C. Punmia, K.K. Khandelwala "Project Planning and Control with PERT and CPM" Laxmi Publication.
3. Gaurav Kumar Sagar and Arvind Kumar Sagar. "Construction Technology and Management" S.K. Katraia and Sons publishers.

Course Outcomes:

The student will be able to

1. Gain information about fundamentals of construction technology, project planning and management techniques.
2. Gain Knowledge about materials and machinery
3. Learn about the tenders and contract, and the rules that govern them.
4. Develop the clear aspects about management skills and multi-tasking.
5. Learn about the quality and safety, and construction related problems.

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**1-0-0**	**4**

(E411K) ELEMENTS OF EARTHQUAKE ENGINEERING
(Professional Elective-V)

Course Objectives:

The student will

1. learn the principles of engineering seismology.
2. understand the design considerations for regular and irregular shapes of building.
3. design of earthquake resistant rc building as per IS 1893:2002
4. study the behaviour of masonry building under seismic loading.
5. understand the concepts of structural and non-structural elements and the ductile detailing of rc member as per IS 13920.

UNIT - I:

Engineering Seismology: Earthquake phenomenon- cause of earthquakes-Faults- Plate tectonics- Seismic Waves-Terms associated with earthquakes-Magnitude/Intensity of an earthquake-scales-Energy Released-Earthquake measuring instruments-Seismoscope, Seismograph, accelerograph-strong ground motions- Seismic zones of India.

Theory of Vibrations: Elements of a vibratory system- Degrees of Freedom-Continuous System-Lumped mass idealization-Oscillatory Motion-Simple Harmonic Motion-Free vibration of single degree of freedom (SDOF) for undamped, damped and critical damping system.

UNIT - II:

Conceptual design: Introduction-Functional Planning-Continuous load path-Overall form-simplicity and symmetry elongated shapes-stiffness and strength-Horizontal and Vertical Members-Twisting of buildings- flexible building systems-choice of construction materials-unconfined concrete-confined concrete.

UNIT - III:

Introduction to earthquake resistant design: Seismic design requirements-regular and irregular configurations of plan-basic assumptions-basic load combinations-permissible stresses-seismic methods of analysis

Reinforced Concrete Buildings: Principles of earthquake resistant deign of RC members-Structural models for frame buildings as per IS 1893:2002, - Vertical irregularities- Plan configuration problems- Determination of design lateral forces- Equivalent lateral force procedure- Lateral distribution of base shear.

UNIT - IV:

Masonry Buildings: Introduction- Elastic properties of masonry assemblage- Categories of masonry buildings- Behavior of unreinforced and reinforced masonry walls- Behavior of Box action and bands, Behavior of infill walls- Improving seismic behavior of masonry buildings- Load combinations and permissible stresses- Seismic design requirements- Lateral load analysis of masonry buildings.

UNIT - V:

Structural and Non-Structural Elements: Sectional shape, variations in elevation- cantilever walls without openings – Failure mechanism of non-structures- Effects of nonstructural elements on structural system- Analysis of non-structural elements- Prevention of non-structural damage.

Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction-Ductility-definition-ductility relationships-Impact of Ductility- Requirements for Ductility-Assessment of Ductility- Factors affecting Ductility- Ductile detailing considerations of RC member as per IS 13920. Behavior of beams and columns during Earthquakes.

Text Books:

1. Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press.
2. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd.

Reference Books:

1. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly, John Wiley & Sons.
2. Masonry and Timber structures including earthquake Resistant Design –Anand S.Arya, Nem chand & Bros.
3. Earthquake –Resistant Design of Masonry Building –Miha Tomazevic, Imperial college Press.

Course Outcomes:

The student will be able to

1. Know the principles of engineering seismology
2. Understand the behaviour of regular and irregular shaped buildings for lateral loads.
3. Design earthquake resistant buildings as per IS 1893:2002
4. Understand the behaviour of masonry building under seismic loading.
5. Gain the knowledge of ductile detailing consideration of RC member as per IS 13920

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B.Tech. CE	L	T-P-D	C
IV Year - I Semester	4	1-0-0	4

(E411L) REHABILITATION AND RETROFITING OF STRUCTURES
(Professional Elective-V)

Course Objectives:

The student will

1. deterioration of structures, distress in structures, causes and prevention.
2. mechanism and types of damage caused in structures. mechanism causes and preventive measures of corrosion in reinforcement.
3. damage of structure due to fire, fire rating of structures, phenomena of desiccation.
4. inspection and testing, symptoms and diagnosis of distress, damage assessment, repair of structure, common types of repairs, repair in concrete structure, repair in under water structure, strength, guniting shotcrete, underpinning.
5. strengthening of structure, strengthening methods retrofitting, jacketing. health monitoring of structures, use of sensors building instrumentation.

UNIT - I:

Introduction – Deterioration of Structures – Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage.

UNIT - II:

Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomenon of Desiccation.

UNIT - III:

Inspection and Testing – Symptoms and Diagnosis of Distress - Damage assessment – Non-Destructive Testing (NDT).

UNIT - IV:

Repair of Structure – Common Types of Repairs – Repair in Concrete Structures – Repairs in Under Water Structures – Guniting – Shotcrete – Underpinning.

UNIT - V:

Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing. Health Monitoring of Structures – Use of Sensors – Building Instrumentation

Text Books:

1. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W. H. Ranso, (1981)

2. Building Failures: Diagnosis and Avoidance, EF & N Spon, London, B. A. Richardson, (1991).

Reference Books:

1. Concrete Technology by A.R. Shanta Kumar, Oxford University press.
2. Defects and Deterioration in Buildings, E F & N Spon, London.
3. Non-Destructive Evaluation of Concrete Structures by Bungey.

Course Outcomes:

The student will be able to

1. Understand the defects and deterioration of structures and the methods of Inspection, testing, repair methodologies besides strengthening measures, health monitoring of structures.
2. Acquire knowledge about rehabilitation of structures.
3. Acquire knowledge about repair structures.
4. Understand repairs in under water structures.
5. Understand building health monitoring structures.

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**1-0-0**	**4**

(E411M) DESIGN AND DRAWING OF IRRIGATION STRUCTURES
(Professional Elective-V)

Objectives:

The student will

1. Gain knowledge in design of irrigation structure.
2. Know the importance of irrigation structures.
3. Know the importance, location, components and types irrigation structures
4. Get experience in drawing of irrigation structures.
5. Know importance of practical application

Design and drawing of the following hydraulic structures.

UNIT I:

Surplus weir.
Syphon Well Drop

UNIT II

Trapezoidal notch fall.
Tank sluice with tower head

UNIT III:

Sloping glacis weir.
Canal regulator

UNIT IV:

Under Tunnel.

UNIT V:

Type III Syphon aqueduct

Text Book:

1. Water Resources Engineering – Principles and Practice by Challa Satyanarayana Murthy, New Age International Publishers.

Reference Book:

1. Irrigation engineering and Hydraulic structures by S.K.Garg, Standard Book House

Outcomes:

The student will be able to

1. Design and draw various irrigation structures.
2. Meet the requirements of irrigation design engineers in large and small consulting firms, and at all levels of government and Private sectors.
3. Know the detail specification of irrigation structures.
4. Know the Design principals of irrigation structures (surplus weir, trapezoidal notch fall, siphon and aqueduct)
5. Exposure of a students in field is very much useful at the end if graduated study.

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**1-0-0**	**4**

(E411N) GROUND IMPROVEMENT TECHNIQUES
(Professional Elective-V)

Course Objectives:
The student will

1. Introduce the various methods of improvement methods of engineering properties of the soil.
2. Introduce the application of engineering methods to ground improvement techniques.
3. Study applications of geotextiles in various civil engineering projects and use of micropiles in the soil stabilization.
4. Apply different methods of soil reinforcement like soil anchors, rock bolts and soil nails in cohesive and granular soils
5. Design dewatering systems to prevent significant groundwater seepage into the excavation and to ensure stability of excavation side slopes.

UNIT - I:
Dewatering: methods of dewatering-sumps, single and multi-stage well points-vacuum well points-horizontal wells-foundation drains-blanket drains-pit area for selection of fill material around drains-electro-Osmosis method.

UNIT - II:
Grouting: objectives of grouting-grouts and their properties-grouting methods-ascending, descending and stage grouting-hydraulic fracturing in soils.

UNIT - III:
In-Situ densification methods in granular soils: vibration at the ground surface, impact at the ground surface, vibration at depth, impact at the depth.
In-Situ densification methods in cohesive soils: preloading or dewatering, vertical drains, sand drains, sand wick geo drains, store and lime columns, thermal methods

UNIT - IV:
Stabilization: Methods of stabilization-mechanical-cement-lime-bituminous-chemical stabilization with calcium chloride, sodium silicate and gypsum.
Reinforced Earth: Principles, components of reinforced earth, factors governing design of reinforced earth walls, design principles of reinforced earth walls.

UNIT - V:
Geo synthetics: Geo textiles, types, functions and applications, geo grids and geo membranes, functions and applications.
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. Engineering Principles of Ground Modification, McGraw-Hill International Edition Hausmann M.R
2. Ground improvement techniques, Purushotham Raj. Laxmi publications, New Delhi

Reference Books:

1. Ground improvement, Moosely M.P (1993) Blackie Academic and Professional, Boca Taton, Florida, USA.
2. Ground control and improvement, John Wiley and sons, New York, USA.
3. Designing with Geo synthetics, Robert M. Koerner, Prentice Hall New Jersey, USA.

Course Outcomes:

The student will be able to

1. Understand the needs and objectives of ground improvement techniques
2. To acquire the knowledge of laboratory and in situ tests for soil improvement projects
3. Acquire the knowledge of surface compaction, admixture stabilization of expansive soil etc.
4. Analyze the importance of Shotcreting and grouting Technology
5. Understand modification by inclusions and confinement

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**1-0-0**	**4**

(E411A) ESTIMATION AND COSTING

Course Objectives:

The student will

1. Understand how to estimate the quantities of work, develop the bill of quantities and arrive at the Cost of civil engineering Project
2. Estimate the detailed quantities of various items of work and their rates in building projects.
3. Estimate the quantities of works and evaluate cost of project.
4. Understand and apply the concept of Valuation for Properties
5. Understand, Apply and Create the Tender and Contract document

UNIT - I:

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

UNIT - II:

Detailed Estimates of Buildings: Rate Analysis, Working out data for various items of work overhead and contingent charges. Reinforcement bar bending and bar requirement schedules.

UNIT - III:

Earthwork for roads and canals.

Estimating the quantities of earthwork for roads and canals.

UNIT - IV:

Contracts: Contracts – Types of contracts – Contract Documents – Conditions of contract.

UNIT - V:

Valuation of buildings. Standard specifications for different items of a building construction.

Text Books:

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and Costing by G.S. Birdie.

Reference Books:

1. Standard Schedule of rates and standard data book by public works department.
2. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.).
3. Estimation, Costing and Specifications by M. Chakrabarti; Laxmi publications.

Course Outcomes:

The student will be able to

1. prepare detailed and abstract estimates for buildings, roads and canals
2. prepare valuation of buildings.
3. interpret contract document of for civil engineering works
4. formulate construction scheduling and project management methods.
5. apply and create the tender and contract document

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E411B) PRESTRESSED CONCRETE STRUCTURES

Course Objectives :

The student will

1. Discuss the basic concepts of pre-stressed concrete structures and assess the advantages of prestressing over RCC.
2. Design post tensioned and pre-tensioned beams and check for strength limit based on IS: 1343 code provisions for safety and durability.
3. Understand short term deflections of uncracked members and predict long term deflections due to creep and shrinkage of members.
4. Analyze and design composite beams and compute the secondary moments in the beam sections
5. Develop an understanding of the design of prestressed concrete members

UNIT - I:

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

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

UNIT - II:

Losses of Prestress: Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage bending of member and frictional losses.

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

UNIT - III:

Design of sections for flexure and shear: Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure, shear, and principal stresses – design for shear in beams – Kern – lines, cable profile.

Analysis of end blocks: by Guyon's method and Mugnel method, Anchorage zone strusses – Approximate method of design – Anchorage zone reinforcement – Transfer of prestress pretensioned members.

UNIT - IV:

Composite section: Introduction – Analysis of stress – Differential shrinkage – General designs considerations.

UNIT - V:

Deflections of prestressed concrete beams: Importance of control of deflections – factors influencing deflections – short term deflections of uncracked members prediction of long-term deflections.

Text Books:

1. Prestressed Concrete by Krishna Raju; - 5th Edition Tata McGraw Hill Publications.
2. Prestressed Concrete by N. Rajasekharan; - Narosa publications.

Reference Books:

1. Prestressed Concrete by Ramamrutham; Dhanpatrai Publications.
2. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H. Burns, John Wiley & Sons. Codes: BIS code on prestressed concrete, IS 1343-2012.

Course Outcomes:

The student will be able to

1. Acquire the knowledge of evolution of process of prestressing.
2. Acquire the knowledge of various prestressing techniques.
3. Develop skills in analysis of prestressed concrete beams, and slabs.
4. Develop skills in design of prestressed concrete beams, and slabs.
5. Develop skills to satisfy the serviceability and strength provisions of the Indian Standards (IS: 1343-2012).

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**0**	**0-3-0**	**2**

(E4101) COMPUTER AIDED DESIGN AND DRAFTING LAB

Course Objectives:

The student will

1. A student will able to know how to apply engineering drawing using computers
2. Describe the significance of structural software and its main features.
3. Impart the knowledge to the students on the structural software package for the analysis and design of concrete and steel structures.
4. Able to do Detailing of RC elements using AUTO CAD
5. To understand the general concepts of engineering drawing and general principles on a CAD

COURSE CONTENTS:

1. Analysis of Beams (Simply Supported and Continuous)
2. Analysis of Plane Frames for Dead and Live loads & L.L
3. Analysis of Space Frames for Dead and Live loads
4. Analysis of Space Frames subjected to wind & Earthquake Loads.
5. Analysis and Design of Residential Building (G + 2 Floors)
6. Analysis and Design of Roof Truss

Note:

Structural frame model generation can be done in any of the two software like (STAAD-PRO/ETABS).

Course Outcomes:

The student will be able to

1. Analyse and interpret the results of a structural analysis &design software
2. Design the structural elements like beam, frame
3. Analyse & design buildings by using structural software ETABS/ STAAD PRO
4. Draw Detailing of RC elements using AUTO CAD.
5. to draft the plan, elevation and sectional views of the buildings, industrial structures, framed buildings using computer software.

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - II Semester	**4**	**1-0-0**	**4**

(E421A) GIS AND REMOTE SENSING

Course Objectives :

The student will be able to

1. The remote sensing serves the purpose of accurate mapping of all features under different spatial and temporal scales of all kinds of terrain and land under water bodies.
2. The remote sensing is advantageous comparatively to traditional surveying techniques in terms of time, accuracy and output.
3. Remote sensing serves the purpose of predictions of all scales.
4. GIS is software which can be used for collecting, storing and analysing of data which is useful for real world applications
5. Remote sensing serves the purpose of serving the water resource application.

UNIT - I:

Introduction to Photogrammetry

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

UNIT - II:

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

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

UNIT - III:

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

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

UNIT - IV:

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

UNIT - V:

Water Resources Applications-I: Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics.

Water Resources Applications – II: Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

Text Books:

1. Remote Sensing and its applications by LRA Narayana University Press 1999.
2. Principals of Geo physical Information Systems – Peter A Burragh and Rachael A. Mc Donnell, Oxford Publishers 2004.

Reference Books:

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

Course Outcomes:

The student will be able to

1. Based on the objective of study a student should have thorough knowledge to choose the remote sensing image from different sensors, resolutions, spatial and temporal scales.
2. Remote sensing gives the provision of understanding and to comprehend large tracks of earth surface with less time and cost but more accuracy.
3. In case of dam construction, for a civil engineer it is must to have knowledge of resource richness of an area, flow rates in stream, channel geometry with respect to time, magnitudes of movement in crust, habitations etc.
4. By GIS the student can communicate to the common man his analysis of different problems developments, benefits by preparing different thematic maps.
5. Remote sensing gives the provision of understanding about water resources management and monitoring.

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - II Semester	**0**	**0-3-0**	**2**

(E4201)REMOTE SENSING & GIS LAB

Course Objectives:

The student will

1. Apply the concepts of Photogrametry and its applications such as determination of heights of objects on terrain.
2. Understand the basic concept of Remote Sensing and know about different types of satellite and sensors.
3. Illustrate Energy interactions with atmosphere and with earth surface features, Interpretation of satellite and top sheet maps
4. Understand different components of GIS and Learning about map projection and coordinate system
5. Develop knowledge on conversion of data from analogue to digital and working with GIS software. To Develop GIS interface to field problems World through geofencing.

UNIT - I:

Development of georeferencing of maps either from cadastral Auto CAD based map.

UNIT - II:

Identification of best locations of ground control points and mosaicking the different sources of maps of information like topo sheets & satellite data and other drawings.

UNIT - III:

Digitization and GIS Coordination.

UNIT - IV:

GIS interface and features using open Source Software QGIS.

UNIT - V:

Case example on mapping like water distinguish, Road alignment road network etc.,

Text Book:

1. Lo, C.P. & Yeung A.K.W., Concepts and Techniques of Geographic Information Systems, Prentice Hall of India, New Delhi, 2002.
2. Burrough, P.A., Principles of Geographical Information Systems, Oxford Publication, 1998.
3. Clarke, K., Getting Started with Geographic Information Systems, Prentice Hall, New Jersey, 2001.
4. DeMers, M. ., Fundamentals of Geographic Information Systems, John Wiley & Sons, New York, 2000.

5. Geo Information Systems – Applications of GIS and Related Spatial Information Technologies, ASTER Publication Co., Chestern (England), 1992.

Course Outcomes:

The student will be able to

1. Understand the concepts of Photogrametry and compute the heights of objects
2. Understand the basic concept of GIS and its applications, know different types of data representation in GIS
3. Apply knowledge of GIS software and able to work with GIS software in various application fields
4. Illustrate spatial and non spatial data features in GIS and understand the map projections and coordinates systems
5. Apply knowledge of GIS and understand the integration of Remote Sensing and GIS

Open Elective - I

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B.Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

DISASTER MANAGEMENT
(Open Elective – I)

Course Objectives:

The students will :

1. To provide basic conceptual understanding the difference between the hazard and a disaster.
2. To gain knowledge about the various disasters and their impacts.
3. To provide basic understanding about the hazard and vulnerability profile of India.
4. To have conceptual understanding about the disaster management phases.
5. To gain approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, Disasters, disaster prevention and risk reduction.

UNIT - I:

Concept of Disaster, Different approaches, Concept of Risk, Levels of Disasters, Disaster Phenomena and Events (Global, national and regional) ,Hazards and Vulnerability, Natural and man-made hazards, response time, frequency and forewarning levels of different hazards, Characteristics and damage potential or natural hazards, hazard assessment ,Dimensions of vulnerability factors, vulnerability assessment Vulnerability and disaster risk ,Vulnerabilities to flood and earthquake hazards.

UNIT II:

Disaster Management Mechanism, Concepts of risk management and crisis managements. Disaster Management Cycle, Response and Recovery Development, Prevention, Mitigation and Preparedness ,Planning for Relief.

UNIT - III:

Capacity Building: Concept, Structural and Non-structural Measures ,Capacity Assessment; Strengthening Capacity for Risk reduction ,Counter-Disaster Resources and their utility in Disaster Management ,Legislative Support at the state and national levels.

UNIT - IV:

Coping with Disaster, Coping Strategies; alternative adjustment processes, Changing Concepts of disaster management ,Industrial Safety Plan; Safety norms and survival kits, Mass media and disaster management.

UNIT - V:

Planning for disaster management, Strategies for disaster management planning, Steps for formulating a disaster risk reduction plan, Disaster management Act and Policy in India. Organizational structure for disaster management in India, Preparation of state and district disaster management plans .

TEXT BOOKS:

1. Alexander, D. Natural Disasters, ULC press Ltd, London, 1993.
2. Carter, W.N. Disaster Management: A Disaster Management Handbook, Asian Development Bank, Bangkok, 1991.
3. Manual on Natural Disaster Management in India, NCDM, New Delhi, 2001.

REFERENCES:

1. Abarquez I. & Murshed Z. Community Based Disaster Risk Management: Field Practitioner's Handbook, ADPC, Bangkok, 2004.
2. Goudie, A. Geomorphological Techniques, Unwin Hyman, London 1990.
3. Goswami, S.C Remote Sensing Application in North East India, Purbanchal Prakesh, Guwahati, 1997.

Course Outcomes:

The Students will be to

1. acquired knowledge on various types of disasters and hazards.
2. distinguish between the hazard and a disaster can be analyzed.
3. acquired knowledge on the various approaches of Disaster Risk Reduction (DRR)
4. ability to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction.
5. develop ability to respond to different disasters.

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B.Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

Elements of Civil Engineering
(Open Elective-I)

Course Objectives:

The students will:

1. To understand different methods of surveying for various applications.
2. To familiarize with various types of building materials.
3. To understand transportation and traffic management.
4. The knowledge of water sources, supply& its treatment.
5. Study about Highway development in India, Necessity for Highway planning, different road development plans..

UNIT - I:

Introduction, history of the civil engineering, sub – disciplines of civil engineering.

UNIT II:

Surveying

Introduction, divisions of surveying, classification of surveying, principles of surveying. Linear measurements and errors–introduction, methods of linear measurements, chaining instruments, types of error and correction. Compass surveying – introduction, angular measurement using compass, whole circle bearing and reduced bearing, fore bearing and back bearing. Traverse surveying –introduction, chain and compass traversing, closing error and adjustments. Levelling– introduction, types of levelling instruments, dumpy level, adjustment of level, levelling staff.

UNIT - III:

Building Materials and Construction

Materials: Introduction to construction materials like ferrous and non ferrous metals, alloys, Stones, Bricks, Lime, Cement, Timber, Sand, Aggregates, Mortar, Concrete and bitumen. Construction: Types of building, different loads considered in building design, types of foundation in building, other developments and constructions of buildings.

UNIT - IV:

Fire and Earthquake Protection in Building Introduction, fire protection in building, structural and architectural safety requirements of resistive structures, fire resistive properties of building materials, fire exit requirements, force and acceleration on building due to earthquake, building response characteristics, building drift.

UNIT - V:

Water Supply, Sanitary and Electrical Works in Building

Introduction, water supply system, water supply layout of a building, house drainage, traps, electrical works in building.

Highway Engineering:

Introduction, historical background of road or highway, classification of roads, pavements and roads, traffic control mechanism.

TEXT BOOKS:

1. Elements of Civil Engineering Author: Mimi Das Saikia, Bhargab Mohan Das and Madan Mohan Das Publisher: PHI Learning Private Limited New Delhi.
2. Elements of Civil Engineering Author: Dr. R.K. Jain and Dr. P.P. Lodha Publisher: McGraw Hill Education, India Pvt. Ltd.
3. Surveying Vol. I Author: Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain16th Edition Publisher: Laxmi Publication Delhi.
4. Building drawing Author: M.G.Shah, C.M.Kale and S.Y.Patki Publisher: Tata McGraw Hill.

Reference Books:

1. Surveying Theory and Practice (7th Edition) Author: James M Anderson and Edward M Mikhail Publisher: McGraw Hill Education, India Pvt. Ltd.
2. Surveying and Leveling Author: R. Subramanian Publisher: Oxford University.
3. Building drawing Author: M.G.Shah, C.M.Kale and S.Y.Patki Publisher: Tata McGraw Hill.
4. Civil Engg. Drawing Author: S. C. Rangwala Publisher: Charotar Pub. House Anand.

Course Outcomes:

Students will be able to

1. Carry out simple land survey and prepare maps showing the existing details.
2. Find out area of irregular shaped plane areas.
3. Understand building plan, elevation and section.
4. Get acquainted with construction materials and transportation systems.
5. Understand transportation and traffic problems.

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Network Analysis and Synthesis
(Open Elective - I)

UNIT I:
Concept of generalized frequency, circuit representation and their response in terms of generalized frequency.

UNIT II:
Fourier transforms and series, Laplace transform, its properties, and Z transforms, its properties and applications, Concept of one port, two-port networks, characteristics and parameters.

UNIT III:
Generalized network functions (Driving point and Transfer), concepts of poles and zeros, determination of free and forced response from poles and zeros, concept of minimum phase networks, analysis of ladder, lattice, T and bridged-T networks.

UNIT IV:
Introduction to state-space representation of networks and their analysis. Concept of filtering, filter types and characteristics, classical design of T and PI passive filters, frequency transformations. Introduction to active filters, active filter specifications, design of first and second order RC –active filters, maximally flat and equi-ripple filter characteristics, implementation using passive elements and op-amps.

UNIT V:
Network synthesis- Synthesis problem formulation, properties of positive real functions, Hurwitz polynomials, properties of RC, LC and RL driving point functions, Foster and Cauer synthesis of LC and RC circuits.

Text Books:

1. Temes & LaPatra – Introduction to circuit Synthesis & Design, McGraw Hill.
2. V. Valkenberg – Modern Network Synthesis, PHI.

Reference Books:

1. Weinberg – Network Analysis & Synthesis, McGraw Hill.
2. Peikari – Fundamentals of Network Analysis & Synthesis, Wiley.
3. V. Atre-- Network Theory and Filter design, TMH.

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Measurements and Instruments

(Open Elective - I)

UNIT - I:

Philosophy Of Measurement- Methods of Measurement, Measurement System, Classification of instrument system, Characteristics of instruments & measurement system, Errors in measurement & its analysis, Standards.

Analog Measurement of Electrical Quantities –Electrodynamics , Thermocouple, Electrostatic & Rectifier type Ammeters & Voltmeters , Electrodynamics' Wattmeter, Three Phase Wattmeter, Power in three phase system , errors & remedies in wattmeter and energy meter. Instrument Transformer and their applications in the extension of instrument range, Introduction to measurement of speed , frequency and power factor.

UNIT - II:

Measurement of Parameters- Different methods of measuring low, medium and high resistances, measurement of inductance & capacitance with the help of AC Bridges, Q Meter.

AC Potentiometer- Polar type & Co-ordinate type AC potentiometers , application of AC Potentiometers in electrical measurement.

UNIT - III:

Magnetic Measurement- Ballistic Galvanometer, flux meter , determination of hysteresis loop, measurement of iron losses

UNIT - IV:

Digital Measurement of Electrical Quantities- Concept of digital measurement, block diagram Study of digital voltmeter, frequency meter Power Analyzer and Harmonics Analyzer; Electronic Multimeter.

UNIT - V:

Cathode Ray Oscilloscope - Basic CRO circuit (Block Diagram),Cathode ray tube (CRT) & its components , application of CRO in measurement ,Lissajous Pattern.; Dual Trace & Dua Beam Oscilloscopes.

Text Books:

1. E.W. Golding & F.C. Widdis, - Electrical Measurement &Measuring Instrument‖, A.H. Wheeler& Co. India.
2. A.K. Sawhney, -Electrical & Electronic Measurement & Instrument‖, Dhanpat Rai & Sons

Reference Books:

1. Forest K. Harries,—Electrical Measurement, Willey Eastern Pvt. Ltd. India .
2. M.B. Stout ,—Basic Electrical Measurement‖ Prentice hall of India.
3. W.D. Cooper,‖ Electronic Instrument & Measurement Technique — Prentice Hall International.
4. Rajendra Prashad ,—Electrical Measurement &Measuring Instrument‖ Khanna Publisher.
5. J.B. Gupta, -Electrical Measurements and Measuring Instruments‖, S.K. Kataria & Sons.

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AUTOMOBILE ENGINEERING
(OPEN ELECTIVE-I)

UNIT – I: Introduction : Components of four wheeler automobile – chassis and body – power unit – power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, reboring, decarburization, Nitriding of crank shaft. Emission from Automobiles – Pollution standards, National and international – Pollution Control – Techniques – Noise Pollution & control.

UNIT – II: Fuel System: S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pumps – carburetor – types – air filters – petrol injection. Electronic injection system
C.I. Engines: Requirements of diesel injection systems, types of injection systems, fuel pump, nozzle, Alternative fuels for Automobiles-injection, Classification, Properties, Hybrid vehicles injection timing, testing of fuel, pumps.

UNIT – III: Cooling System : Cooling Requirements, Air Cooling, Liquid Cooling and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporating cooling – pressure sealed cooling – antifreeze solutions.
Ignition System : Function of an ignition system, battery ignition system, constructional features of storage battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

UNIT – IV: Electrical System : Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc
Transmission System : Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – Gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box , over drive torque converter.Propeller shaft – Hoatch – Kiss drive, Torque tube drive universal joint, differential rear axles– types – wheels and tyres.

UNIT – V: Steering System : Steering geometry – camber, castor, king pin rake, combined angle toe in, center point steering. Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears – types, steering linkages.
Suspension System : Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.
Braking System : Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder tandem master cylinder Requirement of brake fluid, Pneumatic and vacuum brakes.

TEXT BOOKS :

1. Automobile Engineering ,Vol. 1 & Vol. 2/ Kripal Singh
2. Automobile Engineering , Vol. 1 & Vol. 2 ,by K.M Gupta,Umesh publication
3. Automobile Engineering - K.K.Ramalingam –scitech lab

REFERENCE BOOKS :

1. A System approach to Automotive Technology by Jack Erjavec YesDee publishing pvt Ltd.
2. Automobile Engineering / William Crouse
3. Automotive Mechanics / Heitner
4. Alternative fuels of Automobiles by P.RamiReddy, Frontline publications.

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ENGINEERING MATERIALS AND FABRICATION PROCESSES

(OPEN ELECTIVE – I)

UNIT-I: FERROUS ALLOYS: Introduction, Designations and classifications for steels, Simple Heat Treatments, Effect of Alloying Elements.

NONFERROUS ALLOYS: Introduction, properties and applications, Aluminum Alloys, Magnesium Alloys, Copper Alloys and Titanium Alloys.

CERAMIC MATERIALS: Introduction, Properties and Applications of Ceramics, Glasses and Refractories

POLYMERS: Introduction, Classification of Polymers, Polymerization, Degree of Polymerization, Typical Thermoplastics and Thermosets.

COMPOSITES: Introduction, Classification, Properties and Applications of Polymer matrix, Metal Matrix Ceramic Matrix and Laminar composites.

UNIT-II: Casting : Steps involved in making a casting – Advantage of casting and its applications; Patterns - Pattern making, Types, Materials used for patterns, pattern allowances and their construction; Properties of moulding sands.

Methods of Melting - Crucible melting and cupola operation – Defects in castings;

Casting processes – Types – Sand moulding, Centrifugal casting, die- casting, Investment casting, shell moulding; Principles of Gating – Requirements – Types of gates, Design of gating systems – Riser – Function, types of Riser and Riser design.

UNIT-III: Welding: Classification – Types of welds and welded joints; Gas welding - Types, oxy-fuel gas cutting. Arc welding, forge welding, submerged arc welding, Resistance welding, Thermit welding.

Inert Gas Welding _ TIG Welding, MIG welding, explosive welding, Laser Welding; Soldering and Brazing; Heat affected zone in welding. Welding defects – causes and remedies; destructive and non- destructive testing of welds.

UNIT-IV: Hot working, cold working, strain hardening, recovery, re-crystallization and grain growth. Stamping, forming and other cold working processes. Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning. Types of presses and press tools. Forces and power requirement in the above operations.

UNIT-V: Extrusion of Metals : Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion – Extruding equipment – Tube extrusion and pipe making, Hydrostatic extrusion. Forces in extrusion

Forging Processes: Forging operations and principles – Tools – Forging methods – Smith forging, Drop Forging – Roll forging – Forging hammers : Rotary forging – forging defects – cold forging, swaging, Forces in forging operations.

TEXT BOOKS:

1. Donald R. Askland, Pradeep P. Phule, The Science and Engineering of Materials (4th Edition), Thomson Publishers, 2003.
2. William D. Callister Introduction to Material Science and Engineering, John Wiley and Sons, 2007.
3. W.F.Smith, Principles of Materials Science and Engineering, Mc Graw Hill, New York, 1994.

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Principles of Electronic Communications
(OPEN ELECTIVE – I)

Course objectives: The Student will

1. gain knowledge about modulation and various analog modulation schemes.
2. have a broad understanding of Pulse modulation schemes.
3. obtain knowledge on Digital modulation techniques.
4. illustrate the wireless networking concepts.
5. understand the principle of cellular mobile radio systems.

Unit I: Introduction
Block diagram of Electrical communication system, Radio communication, Types of communications: Analog, pulse and digital. Analog Modulation: Need for modulation, Types of Analog modulation, Amplitude Modulation.
Angle Modulation: Frequency & Phase modulations. Generation and Demodulation techniques. Advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, Comparison of FM & PM.

Unit II: Pulse Modulations
Sampling, Nyquist rate of sampling, sampling theorem for Band limited signals, PAM, regeneration of base band signal.
PWM and PPM, Time Divison Multiplexing, Frequency Divison Multiplexing, Asynchronous Multiplexing.

Unit III: Digital Communication
Advantages, Block diagram of PCM, Quantization, effect of quantization, quantization error, Base band digital signal, DM, ADM, ADPCM and comparison.
Digital Modulation: ASK, FSK, PSK, DPSK, QPSK demodulation, offset and non-offset QPSK, coherent and incoherent reception, Modems.

Unit IV: Introduction to Wireless Networking
Introduction, Difference between wireless and fixed telephone networks,
Development of wireless networks, Traffic routing in wireless networks.

Unit V: Cellular Mobile Radio Systems
Introduction to Cellular Mobile System, concept of frequency reuse, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems, Cell splitting.
Handoffs and Dropped Calls Handoff, dropped calls and cell splitting, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assisted handoff, Intersystem

handoff, micro cells, vehicle locating methods, dropped call rates and their evaluation.

TEXT BOOKS:

1. Communication Systems Analog and Digital – R.P. Singh and SD Sapre, TMH, 20th reprint, 2004.
2. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, 2nd Ed., 2002,PHI.

REFERENCE BOOKS:

1. Wireless Communication and Networking – William Stallings, 2003, PHI.
2. Electronic Communication Systems – Kennedy and Davis, TMH, 4th edition, 2004.
3. Communication Systems Engineering – John. G. Proakis and Masoud Salehi, PHI, 2ndEd. 2004.

Course outcomes: The Student will be able to

1. acquire knowledge about analog and angle modulation techniques.
2. illustrate the concepts of Pulse modulation schemes.
3. obtain knowledge on Digital modulation techniques.
4. describe the wireless networking concepts.
5. understand the basics of cellular mobile radio systems and types of handoff.

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MATLAB PROGRAMMING

(Open Elective-I)

Course objectives: The Student will

1. gain knowledge in exploring MATLAB software.
2. be able to find approach for solving Engineering problems using simulation tools.
3. be prepared to use MATLAB in their project works.
4. gain a foundation in use of this software for real time applications.
5. practice numerical methods, simulations and understand MATLAB programming.

UNIT-I: MATLAB basics, The MATLAB Environment, Basic computer programming, Variables and constants, operators and simple calculations, Formulas and functions, MATLAB toolboxes, Exercises.

UNIT-II: Matricers and vectors, Matrix and linear algebra review, vectors and matrices in MATLAB.

Matrix operations and function in MATLAB, Exercises**.**

UNIT-III: Computer programming, Algorithms and structures, MATLAB scripts and functions (m-files).

Simple sequential algorithms, control structures (if…then, loop), Exercises.

UNIT-IV: MATLAB programming, Reading and writing data, file handling, personalized functions.

Toolbox structure, MATLAB graphic functions, Exercises.

UNIT-V: Numerical simulations-Numerical methods and simulations, Random number generation, Montecarlo methods statistics Toolbox, User‘s Guide: Random Number and Generation Functions).

Hands-on session

Interactive hands-on-session where the whole class will develop one or more MATLAB scripts that solve an assigned problem.

TEXT BOOK:

1. MATLAB Programming by Y.Kirani Singh, B.B Chowdari , PHI publications, 2007 edition.
2. MATLAB And Its Applications In Engineering By Rajkumar Bansal , Ashok Kumar Goel, Manoj Kumar Sharma, Pearson Education Publications, version 7.5.

REFERENCE BOOKS:

1. Getting Started With MATLAB By Rudrapratap, Oxford Publication, 2002 Edition.

Course outcomes: The Student will be able to

1. develop programming and simulation for engineering problems.
2. estimate importance of software’s in research by simulation work.
3. prepare basic mathematical, electrical, electronic problems in MATLAB.
4. synthesis basic electronic circuits in simulink.
5. interpret programming files with GUI Simulink.

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DATA STRUCTURES THROUGH C
(Open Elective-I)

Course Objectives:

The Student will:

1. Review the basic concepts of data structures and algorithms.
2. Classify basic concepts of stacks, queues.
3. Understanding searching and sorting techniques.
4. Classify basic concepts about stacks, queues ,lists ,trees and graphs.
5. Know step by step approach in solving problems with the help of fundamental data structures.

UNIT - I:

Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, circular linked list implementation, Doubly linked list implementation, insertion, deletion and searching operations. Applications of linked lists.

UNIT - II:

Stacks-Operations, array and linked representations of stacks, stack applications-infix to postfix conversion, postfix expression evaluation, recursion implementation. Queues-operations, array and linked representations. Circular Queue operations, Dequeue, applications of queue

UNIT - III:

Trees – Definitions, Binary tree representation, Binary search tree, binary tree traversals, AVL tree – operations, B-tree – operations, B+ trees, Red Black tree.

UNIT - IV:

Graphs: Terminology, sequential and linked representation, graph traversals : Depth First Search & Breadth First Search implementation. Spanning trees, Prims and Kruskals method.

UNIT - V:

Searching and Sorting – Big O Notation, Sorting- selection sort, bubble sort, insertion sort, quick sort, merge sort, Searching-linear and binary search methods.

Text Books:

1. **Data Structures Using C** Reema Thareja, Oxford University Press, 2011 Learning.
2. **Data Structures Using C** (Paperback) by Aaron M. Tenenbaum

Reference Books:

1. **C Programming & Data Structures**, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage
2. **C& Data structures** – P. Padmanabham, Third Edition, B.S. Publications.
3. **Data Structures using C** – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education

Course Outcomes:

The student will be able to:

1. Analyze algorithms and algorithm correctness.
2. Apply searching and sorting techniques.
3. Practice stack, queue and linked list operation.
4. Relate tree and graphs concepts.
5. Relates graphs concepts with traversals.

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PYTHON PROGRAMMING
(Open Elective-I)

Course objectives:
Student will:

1. Learn how to design and program Python applications.
2. Learn how to use lists, tuples, and dictionaries in Python programs.
3. Learn how to identify Python object types, Components ,decision statements, pass arguments in Python.
4. Learn how to build and package Python modules for reusability, design object oriented programs with Python classes,use class inheritance in Python for reusability.
5. Learn how to use exception handling in Python applications for error handling

UNIT - I:
Programming paradigms; Structured programming vs object oriented programming, OOPs fundamentals- class, object, abstraction, encapsulation, polymorphism, and inheritance; Introduction to Python Getting started to Python- an interpreted high level language, interactive mode and script mode. Variables, Expressions and Statements Values and types, Variables and keywords, statements, evaluating expressions, operators and operands, order of operations, composition. Functions function calls, type conversion, type coercion, pre-defined functions, composition, user define functions, flow of execution, passing parameters, function parameters and scope. Conditionals and recursion modulus operator, Boolean expression, logical operators, conditional execution, alternative execution, chained and nested conditionals, return statement; Recursion, infinite recursion.

UNIT - II:
Python data structures Strings Creating, initializing and accessing the elements; String operators, comparing strings using relational operators; String functions and methods. **Lists:** Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements; List operations; List functions and Methods, list parameters, nested lists, Matrices.

Dictionaries
Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, dictionary operations traversing, appending, updating and deleting elements, Dictionary functions and methods.

Tuples
Mutability and tuples, Immutable concept, creating, initializing and accessing the elements in a tuple, Tuple functions.

UNIT - III:

Object oriented programming using Python: creating python classes, classes and objects: user defined compound types, attributes, instances as arguments, instances as return values, objects are mutable, copying; classes and functions: pure function, modifiers; Exceptions: raising exceptions, handling exceptions, exception hierarchy.

UNIT - IV:

Classes and methods: object oriented features, optional arguments, initialization method, operator overloading and polymorphism. Inheritance: Basic Inheritance: extending built-ins, overriding and super; Multiple inheritance: the diamond problem, different sets of arguments.

UNIT - V:

Files handling and Exceptions: Text files, writing variables, Directories, Pickling;
Database Programming in Python: Connection module, connect MySQL Data base, perform DDL, DML and DQL operations.

Text Books:

1. **Python 3 Object Oriented Programming,** Dusty Phillips, Packet Publishing, 2010.
2. **Programming in Python 3** - A complete Introduction to the Python Language- Second Edition, Mark Summerfiels, Addison-Wesley 2010.

Reference Books:

1. **Programming Python- 4th Edition**, Mark Lutz, O'Reilly, 2011.
2. **Object-Oriented Programming in Python**, Michael H, Goldwasser, David Letscher, Pearson Prentice Hall, 2008.

Course outcomes:

Students will abel to:

1. Describe to design and program Python applications.
2. Analyze and conversion of to use lists, tuples, and dictionaries in Python programs.
3. Explain the concept to identify Python object types, Components ,decision statements, pass arguments in Python.
4. Apply decision for building and package Python modules for reusability, design object-oriented programs with Python classes, use class inheritance in Python for reusability.

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E-DISASTER MANAGEMENT

(OPEN ELECTIVE-I**)**

Course Objectives

At the end of the course, students will :

1. Explain various disasters and their impacts.
2. Describe storage networking technologies such as FC-SAN, NAS, IP-SAN and data archival solution – CAS.
3. Identify different storage virtualization technologies and their benefits.
4. Understand and articulate business continuity solutions including, backup technologies, and local and remote replication.
5. Identify parameters of managing and monitoring storage infrastructure and describe common storage management activities and solutions.

UNIT-I:

Introduction to Disasters; Examples; Information Availability, Causes of Information Unavailability, Measuring Information Availability.

Consequences of Downtime; Failure Analysis, Single Point of Failure, Fault Tolerance, Multi pathing Software.

UNIT-II:

Backup and Recovery: Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations.

Backup Methods, Backup Process Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Technologies.

UNIT-III:

Local Replication: Source and Target, Uses of Local Replica, Data Consistency, Local Replication Technologies, Restore and Restart Considerations Creating Multiple Replicas, Management. Interface.

Remote Replication: Modes of Remote Replication, Remote Replication Technologies Network Infrastructure.

UNIT-IV:

Securing the Storage Infrastructure, Storage Security Framework, Risk Triad, Assets, Threats, Vulnerability. Storage Security Domains, Securing the Application Access Domain. Securing the Management Access Domain, Securing Backup, Recovery, and Archive (BURA), Security Implementations in Storage Networking SAN , NAS, IP SAN.

UNIT-V:

Monitoring the Storage Infrastructure: Parameters Monitored, Components Monitored, Monitoring Examples, Alerts, Storage Management Activities, Availability management, Capacity management, Performance management, Security Management.

Reporting, Storage Management Examples, Storage Infrastructure Management Challenges, Developing an Ideal, Solution, Storage Management Initiative, Enterprise Management Platforms.

TEXT BOOK:

1. Information Storage and Management: Storing, Managing, and Protecting Digital Information**,** Ganesh Rajaratnam**,** EMC Education Services. Wiley Publications.
2. Executive Guide to Preventing Information Technology Disasters By Richard Ennals. Springer.

REFERENCE BOOKS:

1. Information Management & Computer Security, Port Elizabeth Technikon, Port Elizabeth, MCB UPLtd.
2. Information Security Management Systems, GodesbergerAllee,BSI.

Course Outcomes

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

1. Apply important storage technologies and their features such as availability,replication, scalability andperformance.
2. Show employs project teams to install, administer and upgrade popularstorage solutions.
3. Illustrate virtual servers and storage between remotelocations.
4. Use the knowledge of Disaster ManagementPhases.

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HUMAN COMPUTER INTERACTION

(OPEN ELECTIVE-I)

Course Objectives

At the end of the course , students will :

1. Demonstrate an understanding of guidelines, principles, and theories influencing human computer interaction.
2. Recognize how a computer system may be modified to include human diversity.
3. Select an effective style for a specific application.
4. Design mock ups and carry out user and expert evaluation of interfaces

UNIT I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design, The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT II

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT III

Screen Designing: - Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT IV

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls Components – text and messages, Icons and increases – Multimedia,
colors, uses problems, choosing colors.

UNIT V

Software tools – Specification methods, interface – Building Tools. Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

TEXT BOOK:

1. The essential guide to user interface design, Wilbert O Galitz, WileyDreamTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson EducationAsia

REFERENCE BOOKS:

1. Human – Computer Interaction. Alan Dix, Janet Fincay, GreGoryd, Abowd, RussellBealg,PearsonEducation
2. Interaction Design Prece, Rogers, Sharps. WileyDreamtech.
3. User Interface Design, Soren Lauesen , PearsonEducation.
4. Human –Computer Interaction,D.R.Olsen,Cengage Learning.

Course Outcomes

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

1. Explain the human, Computer components functions regarding interaction with computer
2. Demonstrate Understanding of Interaction between the human and computer Components.
3. Use Paradigms, HCI in the software process.
4. Implement Interaction design basics**.**

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III Year - I Semester	**3**	**0-0-0**	**3**

INTRODUCTION TO MICROPROCESSORS AND MICROCONTROLLERS

(OPEN ELECTIVE-I)

Course Objectives:
At the end of the course, students will learn:

1. Study the Architecture of 8085&8086 microprocessor
2. Learn the design aspects of I/O and Memory Interfacing circuits.
3. Study the Architecture of 8051 microcontroller
4. Make the interfacing in between microprocessor and various peripherals.
5. Know basic feature of 8051 and AVR controller.

UNIT–I:

8086 Architecture:8086 Architecture Functional diagrams, Register organization, memory segmentation, programming model, memory addresses, physical memory organization, architecture of 8086,signal descriptions of 8086-common function signals, Timing diagrams, interrupts of 8086.

UNIT–II:

Instruction set and assembly language programming of 8086: Instruction formats, addressing modes, instruction set, assembler directives, macros, simple programs involving logical, branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

UNIT–III:

I/O Interface: 8255 PPI, Various modes of operation and interfacing to 8086, interfacing keyboard, Display, D/A and A/D converter.
Interfacing with advanced devices: memory interfacing to 8086, interrupt structure of 8086, vector interrupt table, interrupt service routine.
Communication interface: serial communication standards, serial data transfer schemes, 8251 USART architecture and interfacing.

UNIT–IV:

Introduction to Microcontrollers: overview of 8051 microcontroller, architecture, I/O ports, memory organization, addressing modes and instruction set of 8051, simple programs.

UNIT-V:

8051 Real Time control: programming time interrupts, programming external hardware interrupts, Programming the serial communication interrupts, programming 8051 Timers and counters.

Text Books:

1. D.V.Hall, Microprocessors and interfacing,TMGH,2nd Edition 2006.
2. Kenneth.J.Ayala, The8051Microcontroler,3rdEd., C engage Learning.

References:

1. Advanced Microprocessors and Peripherals-A. K. Rayand K.M Bhurchandi, TMH, 2nd Edition 2006.
2. The 8051Microcontrollers.Architecture and programming and applications-K.Uma Rao, Andhe Pallavi,Pearson, 2009.
3. Microcomputer system 8086/8088 family architecture. Programming and design-Du and GA Gibson, PHI 2nd Edition.

Course Outcomes:

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

1. Design and implement programs on 8085 microprocessors.
2. Design and implement programs on 8086 microprocessors.
3. Design interfacing circuits with 8086.
4. Design and implement 8051 microcontroller based systems
5. Understand the concepts related to I/O and memory interfacing

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INTERNET OF THINGS
(OPEN ELECTIVE – I)

Course Objectives:

At the end of the course, students will learn:

1. Explore the interconnection and integration of the physical world and the cyberspace.
2. Able to design and develop IOT Device.
3. Explore the terminology, technology and its applications
4. Understand the concept of M2M (machine to machine) with necessary protocols.
5. To introduce the Python Scripting Language which is used in many IoT devices

UNIT–I:

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates.

UNIT–II:

Domain Specific IoT – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

IoT and M2M –Difference between IoT and M2M, SDN, NFV, Difference between SDN and NFV.

UNIT–III:

Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER.

UNIT–IV:

Network & Communication aspects

Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination

UNIT-V:

Challenges in IoT

Design challenges, Development challenges, Security challenges, other challenges

Domain specific applications of IoT

Home automation, Industry applications, Surveillance applications, Other IoT applications

Text Books:

1. Internet of Things – A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547

Course Outcomes:

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

1. Understand the application areas of IOT
2. Realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks.
3. Building blocks of Internet of Things and characteristics.
4. Design and implementation/modification of methods involved in IoT.
5. Describe what IoT is and the skill sets needed to be a network analysis.

Open Elective - II

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ESTIMATION, QUANTITY SURVEY & VALUATION
(Open Elective-II)

Course Objective

The main objective of the course is to

1. Understand how to estimate the quantities of work, develop the bill of quantities and arrive at the Cost of civil engineering Project
2. Estimate the detailed quantities of various items of work and their rates in building projects.
3. Estimate the quantities of works and evaluate cost of project.
4. Understand and apply the concept of Valuation for Properties
5. Understand, Apply and Create the Tender and Contract document.

UNIT - I:

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

UNIT II:

Detailed Estimates of Buildings - Reinforcement bar bending and bar requirement schedules

UNIT - III:

Earthwork for roads and canals.

UNIT - IV:

Rate Analysis – Working out data for various items of work over head and contingent charges.

UNIT - V:

Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation - Standard specifications for different items of building construction.

Text Books:

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and Costing by G.S. Birdie.

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WASTE MANAGEMENT
(Open Elective-II)

Course Objectives:

1. To learn about Solid Waste management
2. To describe the collection, treatment and disposal methods of Solid waste

UNIT - I:

Introduction

Definition of solid waste, garbage, rubbish-Sources and Types of solid wastes Municipal waste, industrial waste, plastic waste, electronic waste, bio-medical waste and hazardous waste - Characteristics of Solid Wastes: Physical, chemical and biological characteristics-Problems due to improper disposal of solid waste.

UNIT II:

Functional Elements of Solid Waste Management

Waste generation and handling at source-onsite storage-Collection of solid wastes Collection methods and services-storage of solid waste- guidelines for collection route layout.

UNIT - III: Transfer and Transport of Wastes

Transfer station-types of vehicles used for transportation of solid Waste-Processing and segregation of the solid waste- various methods of material segregation.

Processing and Transformation of Solid Wastes

Recycling and recovery principles of waste management- Composting: definition methods of composting-advantages of composting- Incineration: definition methods of incineration advantages and disadvantages of incineration.

UNIT - IV: Treatment and Disposal of Solid Waste

Volume reduction, Open dumping, land filling techniques, Landfills: classification Design and Operation of landfills, Land Farming, Deep well injection.

UNIT - V: Waste Minimization

Introduction to waste minimization, waste minimization techniques-5R (refuse, reduce, reuse, recover, recycle), municipal waste minimization, industrial waste minimization.

Text Books:

1. Solid and hazardous waste management by M.N.Rao and Razia sultana, BS publications
2. Environmental Engineering by Howard S.Peavy, Donald R.Rowe and George Tchobanognous

Reference Books:

1. Integrated Solid Waste Management by Tchobanognous.
2. Environmental engineering by Y.Anjaneyulu, B.S publication.
3. Environmental Pollution Control Engineering by C.S. Rao; Wiley Eastern Ltd., New Delhi.
4. Environmental engineering by Gerad Kiley, Tata Mc Graw Hill

Course Outcomes:

Students will be able to

1. Identify the types and sources of solid waste, and its characteristics.
2. Employ the treatment and disposal methods of solid waste.
3. Apply the concepts of solid waste management.

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NON-CONVENTIONAL ENERGY SOURCES AND APPLICATIONS

(Open Elective - II)

UNIT-I:

Introduction: Limitations of conventional energy sources, need and growth of alternate energy sources, basic schemes and applications of direct energy conversion.

MHD Generators: Basic principles and Hall Effect, generator and motor effect, different types of MHD generators, conversion effectiveness. Practical MHD generators, applications and economic aspects.

UNIT-II:

Solar Energy: Photovoltaic effect, characteristics of photovoltaic cells, conversion efficiency, solar batteries and applications. Solar energy in India, solar collectors, solar furnaces & applications.

UNIT-III:

Thermo-electric Generators: See back effect, peltier effect, Thomson effect, thermoelectric convertors, brief description of the construction of thermoelectric generators, applications and economic aspects.

Fuel Cells: Principle of action, gibbs free energy, general description of fuel cells, types, construction, operational characteristics and applications.

UNIT-IV:

Miscellaneous Sources: Geothermal system, characteristics of geothermal resources, choice of generators, electric equipment and precautions. Low head hydro plants, definition of lowhead hydro power, choice of site and turbines. Tidal energy, idea of tidal energy, tidal electric generator, limitations.

UNIT-V:

8051 Real Time control:

Programming time interrupts, programming external hardware interrupts, and programming the serial communication interrupts, programming 8051 Timers and counters.

Text Books:

1 D.S.Chauhan, „Non Conventional Energy Resources" New Age Publication

2. G.D. Rai, „Non-conventional energy sources", Khanna Publishers

Reference Books:

1. B.H.Khan, „Non Conventional Energy Resources" TMH.
2. H.P.Garg and Jai Prakash, „Solar Energy Fundamentals and Applications", TMH

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Electrical Technology
(Open Elective - II)

UNIT - I:
D.C Generators and DC Motors:
Principle of operation of DC Machines- EMF equation – Types of generators – Magnetization and load characteristics of DC generators, DC Motors – Types of DC Motors – Characteristics of DC motors – 3-point starters for DC shunt motor – Losses and efficiency – Swinburne's test – Speed control of DC shunt motor – Flux and Armature voltage control methods.

UNIT - II:
Transformers & Performance:
Principle of operation of single phase transformer – types – Constructional features – Phasor diagram on No Load and Load – Equivalent circuit, Losses and Efficiency of transformer and Regulation – OC and SC tests – Predetermination of efficiency and regulation (Simple Problems).

UNIT - III:
Three Phase Induction Motor:
Principle of operation of three-phase induction motors –Slip ring and Squirrel cage motors – Slip-Torque characteristics – Efficiency calculation – Starting methods.

UNIT - IV:
Alternators:
Alternators – Constructional features – Principle of operation – Types - EMF Equation – Distribution and Coil span factors – Predetermination of regulation by Synchronous Impedance Method – OC and SC tests.

UNIT - V:
Special Motors & Electrical Instruments:
Principle of operation - Shaded pole motors – Capacitor motors, AC servomotor, AC tachometers, Synchros, Stepper Motors – Characteristics, Basic Principles of indicating instruments – Moving Coil and Moving iron Instruments (Ammeters and Voltmeters).

Text Books:

1. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.
2. Basic Electrical Engineering - T.K. Nagasarkar and M. S. Sukhija, Oxford University Press, 2005

Reference Books:

1. Principles of Electrical Engineering - V.K Mehta, S. Chand Publications.
2. Theory and Problems of basic electrical engineering - I.J. Nagarath and D.P Kothari, PHI Publications
3. Essentials of Electrical and Computer Engineering - David V. Kerns, JR. J. David Irwin

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OPERATIONS RESEARCH
(Open Elective-II)

UNIT I: Introduction - Development – Definition– Characteristics and Phases – Types of models – Operations Research models – applications.
ALLOCATION: Linear Programming Problem - Formulation – Graphical solution – Simplex method – Artificial variables techniques: Two–phase method, Big-M method; Duality Principle.

UNIT II: TRANSPORTATION PROBLEM – Formulation – Optimal solution, unbalanced transportation problem – Degeneracy.
Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem; Traveling Salesman problem.

UNIT III: SEQUENCING – Introduction – Flow **–**Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines
REPLACEMENT: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely-Group Replacement.
UNIT IV: THEORY OF GAMES: Introduction –Terminology– Solution of games with saddle points and without saddle points- 2 x 2 games –m x 2 & 2 x n games - graphical method – m x n games - dominance principle.
INVENTORY: Introduction – Single item, Deterministic models – Types - Purchase inventory models with one price break and multiple price breaks – inventory models with and without shortage cost. Stochastic models – demand discrete variable or continuous variable – Single Period model with no setup cost.

UNIT V: WAITING LINES: Introduction – Terminology-Single Channel – Poisson arrivals and Exponential Service times – with infinite population and finite population models– Multichannel – Poisson arrivals and exponential service times with infinite population.
DYNAMIC PROGRAMMING:
Introduction – Terminology- Bellman's Principle of Optimality – Applications of dynamic programming- shortest path problem – linear programming problem.
SIMULATION:- Definition – types of simulation models- applications ,advantages and disadvantage. Brief introduction of simulation languages – inventory and queuing problems using random numbers

TEXT BOOKS :

1. Operation Research /J.K.Sharma/MacMilan.
2. Operations Research / ACS Kumar/ Yesdee

REFERENCES:

1. Operations Research: Methods and Problems / Maurice Saseini, Arhur Yaspan and Lawrence Friedman
2. Operations Research /A.M.Natarajan, P. Balasubramaniam, A. Tamilarasi/Pearson Education
3. Operations Research / Wagner/ PHI Publications.
4. Introduction to O.R/Hillier & Libermann (TMH).

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NANOTECHNOLOGY

(Open Elective **–II)**

UNIT I: Introduction to nanotechnology: Importance of nano scale, Nanostructure types, electronic, magnetic, optical Properties of Nano materials, top-down and bottom- up approach to nanostructures.

Quantum Mechanical phenomenon in nanostructures: Quantum confinement of electrons in semiconductor Nano structures, one dimensional confinement (Quantum wires), two dimensional confinements (Quantum Wells), three dimensional confinements (Quantum dots).

UNIT II: Carbon Nano Structures: Carbon nano tubes (CNTs), Fullerenes, C60, C80 and C240 Nanostructures, Properties (mechanical, optical and electrical) and applications.

Fabrication of Nano materials: Physical Methods: Inert gas condensation, Arc discharge, RF plasma, Plasma arc technique, Ion sputtering, Laser ablation, Laser pyrolysis, Molecular beam epitaxy, Chemical vapour deposition method.

UNIT III: Nano scale characterization techniques: Scanning probe techniques (AFM, MFM, STM, SEM, TEM), XRD

Nano devices and Nano medicine: Lab on chip for bioanalysis, Core/shell Nanoparticles in drug delivery systems (site specific and targeted drug delivery), cancer treatment, and bone tissue treatment.

UNIT IV: Nano and molecular electronics: Resonant-Tunneling structures, single electron tunneling, Single Electron transistors, coulomb blockade, giant magneto resistance, tunneling magneto resistance.

UNIT V: Nanolithography and Nano manipulation: e-beam lithography and SEM based nanolithography and nano manipulation, Ion beam lithography, oxidation and metallization. Mask and its application. Deep UV lithography, X-ray based lithography.

TEXT BOOKS :

1. Introduction to Nanotechnology: Charles.P.Pode, Springer Publications, 2008.
2. Springer Handbook of Nanotechnology: Bharat Bhusan, Springer Publications, 2010.

REFERENCES:

1. Principles of Nanotechnology: Phani Kumar, Scitech Publications.
2. Transport in Nano structures: David Ferry, Cambridge University Press 2000
3. Nano-biotechnology; C.M. Niemeyer, C.A. Mirkin, Wiley Publications, 2006.

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APPLICATIONS OF MICROPROCESSORS AND CONTROLLERS

(Open elective-II)

Course Objectives: The Student will

1. understand the control systems and types of control systems
2. understand the basic 16-bit microprocessor architecture and its functionalities and develop microprocessor basic programs for various applications.
3. develop the microcontroller based programs for various applications.
4. understand basic feature of 8051 controller.
5. understand the basics of PLC and SCADA and their functionalities.

Unit I: Introduction: Control Systems Components Role of control system in instrumentation, Open and close loop control system, types and Block diagram, Servomechanism and regulators with suitable examples, Basic control actions - On-off, Proportional, Derivative, Integral control, Proportional derivative (PD).

Proportional integral (PI), P Proportional integral and Derivative (PID) control, Basic control system components –AC/ DC Servo motor, AC/ DC Tacho generator, Stepper motor and Synchronous motor.

Unit II: Basics of Microprocessor

Introduction to microprocessor, Advantages and disadvantages of microprocessor control, Structure of microprocessor, Generalized architecture of microprocessor, Functions of each block, Functional block diagram of 8085 microprocessors with pin diagram, logical block diagram of 8085 Microprocessor-Registers.

ALU, memory organization, decoder, serial control section, interrupt section, timing and control section, Assembly language Programming of 8085, Addressing Modes, Instruction classification, Instruction formats, Basic Assembly Language programming (only simple arithmetic operations-addition, subtraction).

Unit III: Basics of Microcontroller 8051

Micro controllers and microprocessors, Pin diagram of 8051 microcontrollers, Internal RAM, ROM and Special function registers in 8051chip, I/O ports.

Counters and Timers, interfacing with external memory I/O ports, Counters and Timers, Interfacing with external memory.

Unit IV: Microprocessor and Microcontroller Applications

Different types of memories: ROM, RAM, PROM, EPROM, EEPROM, Schematic diagram of memory chips decoder, memory interfacing., Memory I/O data transfer scheme for 8255.

Interfacing of switches and LEDs, Simple application ns of microprocessor and Microcontroller for temperature control of furnace, Traffic light control and SCR firing angle control using microprocessor, Data acquisition system.

Unit V: Programmable Logic Controller and SCADA

PLC: CPU, I/O modules, bus system, power supplies and remote I/Os, counter, timer, Different PLC's available in market, Selection of a PLC, SCADA- Concept and Application.

TEXT BOOKS:

1. Control Systems Engineering, Nagarath I. J., Gopal M., New Age Publishers, New Delhi.
2. Microprocessor Architecture, Programming and Applications with 8085, Gaonkar, Ramesh S., Penram International Publishing (India) Pvt. Ltd.
3. The 8051 Microcontroller Architecture, Programming and Applications, Ayala, Kenneth J., Penram International Publishing (I) Pvt. Ltd.
4. Programmable Logic Controllers And Applications, Webb, John W Ronald Reis. A., Prentice Hall of India, New Delhi.

REFERENCE BOOKS:

1. Fundamentals of Microprocessors and Microcontrollers, Ram, B., Dhanpat Rai Publications, New Delhi.
2. Microprocessors and Interfacing Programming and Hardware, Hall, Douglass V., TMH publication, New Delhi.
3. The 8051 Microcontroller and Embedded Systems using Assembly and C, Ali, Muhamad Mazidi, Janice Mazidi Gillispie, Roli, PHI Learning, New Delhi.

Course Outcomes: The Student will be able to

1. design the different types of control systems and to full fill the desired specifications.
2. analyze 8085 microprocessors architectures and its functionalities and real time applications using programming languages like Assembly Language and MASM.
3. explain the basics of 8051 microcontroller's architecture and its functionalities.
4. design microcontroller based projects for real time applications.
5. analyze PLC and SCADA and their functionalities.

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FUNDAMENTALS OF HDL

(Open Elective-II)

Course Objectives: Students will

1. learn the fundamental of HDL language.
2. get the Knowledge about different levels of abstract.
3. construct Procedures, Tasks, and Functions using language.
4. write the programs in Mixed –Language Descriptions
5. define Synthesis and mapping of digital design

Unit I: Introduction: Why HDL?, A Brief History of HDL, Structure of HDL Module, Operators, Data types, Types of Descriptions, simulation and synthesis, Brief comparison of VHDL and Verilog.
Data –Flow Descriptions: Highlights of Data-Flow Descriptions, Structure of Data-Flow Description, Data Type – Vectors.

Unit II: Behavioral Descriptions
Behavioral Description highlights, structure of HDL behavioral Description, The VHDL variable –Assignment Statement, sequential statements.
Structural Descriptions: Highlights of structural Description, Organization of the structural Descriptions, Binding, state Machines, Generate, Generic, and Parameter statements.

Unit III: Procedures, Tasks, and Functions
Highlights of Procedures, tasks, and Functions, Procedures and tasks, Functions. Advanced HDL Descriptions: File Processing, Examples of File Processing.
Mixed –Type Descriptions: Why Mixed-Type Description? VHDL User-Defined Types, VHDL Packages, Mixed-Type Description examples.

Unit IV: Mixed –Language Descriptions
Highlights of Mixed-Language Description, How to invoke One language from the Other.
Mixed-language Description Examples, Limitations of Mixed-Language Description.

Unit V: Synthesis Basics
Highlights of Synthesis, Synthesis information from Entity and Module.
Mapping Process and Always in the Hardware Domain.

TEXT BOOKS:
1. HDL Programming (VHDL and Verilog)- Nazeih M.Botros- John Weily India Pvt. Ltd. 2008.

REFERENCE BOOKS:
1. Fundamentals of HDL – Cyril P.R. Pearson/Sanguin 2010.
2. VHDL -Douglas perry-Tata McGraw-Hill.

3. A Verilog HDL Primer- J.Bhaskar – BS Publications.
4. Circuit Design with VHDL-Volnei A.Pedroni-PHI.

Course Outcomes: Students will be able to

1. understand the fundamental of HDL language.
2. analyze different levels of abstract.
3. create Procedures, Tasks, and Functions.
4. implement tasks in Mixed –Language Descriptions.
5. evaluate Synthesis and mapping of digital design.

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DATABASE MANAGEMENT SYSTEMS
(Open Elective-II)

Course Objectives:
The Student will:

1. Understanding of the architecture and functioning of database management systems as well as associated tools and techniques.
2. Understand and apply the principles of data modeling using entity relationship and develop a good database design.
3. Understand the use of structured query language (SQL) and its syntax.
4. Apply normalization techniques to normalize a database.
5. Understand the need of database processing and learn techniques for controlling the consequences of concurrent data access.

UNIT - I:

Data base System Applications, data base System VS file System – View of Data – Data Abstraction –Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor

ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model

UNIT - II:

Introduction to the Relational Model

-Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views.

Relational Algebra

-Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

UNIT - III:

Form of Basic SQL Query

-Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity‟s – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

Schema refinement

-Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.

UNIT - IV:

Transaction Concept

-Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability– Implementation of Isolation – Testing for serializability- Lock – Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity.

Recovery and Atomicity

-Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.

UNIT - V:

Data on External Storage

-File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.

Advanced Database Management System

Introduction to Distributed Database-Reference Architecture, fragmentation, Allocation, Joins

Text Books:

1. **Data Base Management Systems**, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
2. **Data base System Concepts**, Silberschatz, Korth, McGraw hill, V edition.

Reference Books:

1. **Data base Systems design,** Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. **Fundamentals of Database Systems,** Elmasri Navrate Pearson Education
3. **Introduction to Database Systems,** C.J.Date Pearson Education

Course Outcomes:

The student will be able to:

1. Describe basic concepts of database system.
2. Design a data model and schemas in RDBMS.
3. Use RDBMS for developing industry applications.
4. Be competent in use of structured query language sql.
5. Analyze functional dependencies for designing a robust database

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CLOUD COMPUTING
(Open Elective-II)

Course Objectives:
Student will:

1. Learn about the cloud environment, services and hadoop
2. Classify cloud platforms and virtualization concepts
3. Identify cloud computing applications and enterprise cloud computing paradigms
4. Demonstrate cloud application development using python
5. Explain security concepts in the cloud

UNIT-I:

Principles of Parallel and Distributed Computing, Introduction to cloud computing, Cloud computing Architecture, cloud concepts and technologies, cloud services and platforms, Cloud models, cloud as a service, cloud solutions, cloud offerings, introduction to Hadoop and Mapreduce.

UNIT-II:

Cloud Platforms for Industry, Healthcare and education, Cloud Platforms in the Industry, cloud applications. Virtualization, cloud virtualization technology, deep dive: cloud virtualization,

Migrating in to cloud computing, Virtual Machines Provisioning and Virtual Machine Migration Services, On the Management of Virtual Machines for cloud Infrastructure, Comet cloud, T-Systems

UNIT-III:

Cloud computing Applications: Industry, Health, Education, Scientific Applications, Business and Consumer Applications, Understanding Scientific Applications for Cloud Environments, Impact of Cloud computing on the role of corporate IT.

Enterprise cloud computing Paradigm, Federated cloud computing Architecture, SLA Management in Cloud Computing, Developing the cloud: cloud application Design.

UNIT-IV:

Python Basics, Python for cloud, cloud application development in python, Cloud Application Development in Python.

Programming Google App Engine with Python: A first real cloud Application, Managing Data in the cloud, Google app engine Services for Login Authentication, Optimizing UI and Logic, Making the UI Pretty: Templates and CSS, Getting Interactive. Map Reduce Programming Model and Implementations.

UNIT-V:

Cloud management, Organizational Readiness and change management in the cloud age , Cloud Security, Data security in the cloud, Legal Issues in the Cloud , Achieving Production Readiness for the cloud Services

TEXT BOOKS:

1. Cloud Computing: Raj Kumar Buyya , James Broberg, andrzej Goscinski, 2013 Wiley
2. Mastering Cloud Computing: Raj Kumar buyya, Christian Vecchiola,selvi-2013.

REFERENCE BOOKS:

1. Cloud Computing: Arshdeep Bahga, Vijay Madisetti, 2014, University Press.
2. Cloud computing: Dr Kumar Saurab Wiley India 2011.
3. Code in the Cloud: Mark C.Chu-Carroll 2011, SPD.(Second part of IV UNIT)

Course Outcomes:

Student will able to:

1. Understand about the cloud environment, services and hadoop
2. Differentiate cloud platforms and virtualization concepts
3. Describe cloud computing applications and enterprise cloud computing paradigms
4. Implement cloud application development using python
5. Apply security concepts in the cloud

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E-WASTE MANAGEMENT

(OPEN ELECTIVE-II)

Course Objectives

At the end of the course , students will :

1. Know regarding E-Waste Management in India Global E-Waste Growth
2. Analyze the overview of WEEE.
3. Understanding scenarios for E-Waste management.
4. Visualize the basic concepts of E-Waste Regulation
5. Understand the basic concepts of Recycling technologies.

UNIT – I:

Introduction to e-Waste Management in India Global e-waste growth, Dark shadows of digitization on Indian horizon, e-waste generation, migration, Present practice and systems, disposal methods, Present processing practices, Initiatives to manage e-waste, Strengths and weaknesses of the current system.

UNIT – II:

WEEE (waste electrical and electronic equipment) - toxicity and healthHazardous substances in waste electrical and electronic equipment-toxicity and release, Occupational and environmental health perspectives of e-waste recycling.

UNIT – III:

Options and Scenarios for e-Waste Management Actions to be considered to achieve goals of e- waste management, Collection/ take back system, Closing the Plastic loop: Turning the supplychain into a supply cycle by mining plastics from end-of-life electronics and other durable
goods.

UNIT – IV:

E-waste regulation: E-waste legislation in the European Union and the Basel Convention. Regulating e-waste: a review of the international and national legal framework on e-waste Extended producer responsibility: a key tool for international rules and regulations on e-waste

UNIT – V:

Recycling technologies for e-waste Recycling of e-scrap in a global environment opportunities and challenges. Technologies for recovery of resources from e-waste. Reuse:A Bridge from Unsustainable e-waste to sustainable e-resources.

TEXT BOOKS:

1. Rakesh Johri, E-waste: Implications, regulations, and management inIndia and current global best practices.

2. Klaus Hieronymi, RamzyKahhat, Eric Williams, E-Waste Management: from Waste toResource

REFERENCE BOOKS:

1. Satish Sinha, PritiMahesh,Waste Electrical and Electronic Equipment The EU andIndia.
2. By Ronald E. Hester, Roy M. Harrison , Electronic WasteManagement.

Course Outcomes

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

1. Demonstrate knowledge of E-Waste management.
2. Implementing environmental health perspectives of E-Waste recycling.
3. Achieve goals of E-Waste management.
4. Develop the skills in E-Waste extended producer responsibility.
5. Describe the technologies for recovery of resources from E-Waste.

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INTRODUCTION TO WEB DESIGN

(OPEN ELECTIVE-II**)**

Course Objectives

At the end of the course , students will :

1. Know regarding internet related technologies.
2. Understanding of the current industry support for web technologies.
3. Explain the basic concepts of CSS.
4. Visualize the basic concepts of PHP.
5. Understanding PHP functions and Methods

UNIT-I

Basics in Web Design: Brief History of Internet, What is World Wide Web, Why create a web site, Web Standards, Audience requirement.

Web Design Principles: Basic principles involved in developing a web site, Planning process , Five Golden rules of web designing, Designing navigation bar ,Page design, Home Page Layout, Design Concept.

UNIT-II

Introduction to HTML : What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags, HTML Tables, HTML Forms.

Elements of HTML: Introduction to elements of HTML, Working with Text Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

UNIT-III

Introduction to Cascading Style Sheets: Concept of CSS, Creating Style Sheet and types of CSS, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties).

CSS Advanced (Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Colors, Creating page Layout and Site Designs.

UNIT-IV

Introduction to PHP: Downloading, installing, configuring PHP, The anatomy of a PHP Page. Basic Security Guidelines, Variables, Data Types, Operators and Expressions, Constants, Flow Control Functions; Switching Flow, Loops.

Code Blocks and Browser Output, Objects, Strings Processing, Form processing, Connecting to database, using cookies, dynamic contents.

UNIT-V

Introduction to Web Publishing or Hosting : Creating the Web Site, Saving the site, Working on the web site, Creating web site structure, Creating Titles for web pages, Themes-Publishing web sites.

TEXT BOOK:

1. Dietel and Dietel : —Internet and World Wide Web - How to Program‖, 5th Edition, PHI/Pearson Education,2011
2. Web Technologies: HTML,CSS, XML,Php BlackBook.

REFERENCE BOOKS:

1. Chris Bates, —Web Programming, building internet applications‖, 2ndEdition, WILEY, Dreamtech,2008.
2. HTML 5 in simple steps Kogent Learning Solutions Inc, DreamtechPress
3. Beginning CSS: Cascading Style Sheets for Web Design Ian Pouncey, ichard York Wiley India.

Course Outcomes:

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

1. Develop the application of the HTML for documentstructure.
2. Develop the skills in analyzing the usable of awebsite.
3. Create dynamic webpage, usingPHP.
4. Using PHP to manipulateFiles.
5. Develop the concept of webpublishing

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INTRODUCTION TO EMBEDDED SYSTEMS

(OPEN ELECTIVE-II)

Course Objectives:
At the end of the course, students will learn:

1. Understand the basic concepts of embedded systems and 8051 microcontrollers.
2. Compare and contrast the basics of assembly programming language.
3. Identify the unique characteristics of real-time systems
4. Analyze the general structure of a real-time system and define the unique design problems and challenges of real-time systems.
5. Acquaint the embedded software development tools and various advanced architectures.

UNIT–I:

Embedded Computing: Introduction, complex systems and microprocessor, the embedded system design process, formalisms for system design, design examples.

UNIT–II:

The 8051 Architecture: Introduction, 8051 micro controller hardware, input/output ports and circuits, external memory, counter and timers, serial data input/output, interrupts.

Basic Assembly Language Programming Concepts: The assembly language programming process, programming tools and techniques, programming the 8051. Data transfer and logical instructions, arithmetic operations, decimal arithmetic, jump and call instructions.

UNIT–III:

Introduction to Real-Time Operating Systems: Tasks and task states, tasks and data, semaphores, and shared data; message queues, mailboxes and pipes, timer functions, events, memory management, interrupt routines in an RTOS environment.

Basic Design Using a Real-Time Operating System: Principles, semaphores and queues, hard real-time scheduling considerations, saving memory and power, an example RTOS like uC-OS (open source).

UNIT–IV:

Embedded Software Development Tools: Host and target machines, linker/locators for embedded software, getting embedded software into the target system

Debugging Techniques: Testing on host machine, using laboratory tools, an example system.

UNIT-V:

Introduction to advanced Architectures: ARM and SHARC, processor and memory organization and instruction level parallelism; networked embedded systems: bus protocols, I^2C bus and CAN bus; internet-enabled systems, design example-elevator controller.

Text Books:

1. Wayne Wolf (2008), Computers as Components-principles of embedded computer system design, Elseveir, New Delhi, India.
2. Kenneth J. Ayala (2008), The 8051 Microcontroller, 3rd edition, Cengage Learning, India.

References:

1. David E. Simon (1999), An Embedded Software Primer, Pearson Education, India.
2. Jean J. Labrosse (2000), Embedding System Building Blocks, 2nd edition, CMP publishers, USA.
3. Raj Kamal (2004), Embedded Systems, Tata McGraw hill, India.

Course Outcomes:

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

1. Program an embedded system
2. Analyze Interfacing with keyboard, A/D & D/A conversions, serial data Communication, LCD and LED display.
3. Illustrate Tasks, Semaphores, Message queues, pipes, Timer functions.
4. Design embedded systems and real-time systems
5. Compare and contrast ARM, SHARC, internet enabled systems.

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FUNDAMENTALS OF E-COMMERCE

(OPEN ELECTIVE-II)

Course Objectives:

At the end of the course, students will learn:

1. Identify the major categories and trends of e-commerce applications.
2. Identify the essential processes of an e-commerce system.
3. Identify several factors and web store requirements needed to succeed in e-commerce.
4. Discuss the benefits and trade-offs of various e-commerce clicks and bricks alternatives.
5. Understand the main technologies behind e-commerce systems and how these technologies interact.

UNIT–I:

Introduction: Electronic Commerce Framework, The Anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications.

UNIT–II:

Consumer Oriented Applications: Mercantile process models, mercantile models from the consumer's perspective, Mercantile from the merchant's perspective.

Types of Electronic Payment Systems, Digital Token-Based Electronic Payment Systems, Smart Cards & Electronic Payment Systems, Credit Card- Based Electronic Payment Systems, Risk & Electronic Payment Systems, Designing Electronic Payment Systems.

UNIT–III:

Electronic Data Interchange: EDI Applications in Business, EDI implementation, MIME, and value added networks.

Intra organizational E-Commerce, Macro forces and Internal Commerce, Work flow automation and Coordination, Customization and Internal Commerce, Supply Chain Management(SCM).

UNIT–IV:

Making a business case for a Document Library, Digital document types, Corporate Data warehouses, Advertising and Marketing, the new age of Information Based Marketing, advertising on Internet, charting the Online marketing process, Market Research.

UNIT-V:

Consumer Search and Resource Discovery, information search and Retrieval, Electronic commerce catalogs or directories, Information Filtering.

Multimedia and Digital video, Key Multimedia concepts, Digital Video & Electronic Commerce, Desktop Video Processing, Desktop Video Conferencing.

Text Books:

1. "Frontiers of electronic commerce" – Kalakota, Whinston, Pearson
2. "E-Commerce", S.Jaiswal – Galgotia

References

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce",Addison-Wesley.
2. Goel, Ritendra "E-commerce", New Age International Laudon, "E-Commerce: Business, Technology, Society", Pearson Education

Course Outcomes:

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

1. Identify the business relationships between the organizations and their customers
2. Perform various transactions like payment, data transfer and etc.
3. Examine some typical distributed applications.
4. Detail some of the problems that are encountered when developing distributed applications.
5. Analyze the technologies that are used to support distributed applications.

Open Elective - III

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ENVIRONMENTAL IMPACT ASSESSMENT
(Open Elective-III)

Course Objectives: The Course objectives of this course are

1. To impart knowledge on Environmental management and environmental impact assessment.
2. To provide a basic understanding of the EIA process as it is used for research, planning, project or program evaluation, monitoring and regulatory enforcement.
3. To outline the impacts on soil, wetlands, flora, fauna, historical structures and the other socioeconomic environment.
4. To introduce students to the legal, economic, social, administrative and technical process preparing and evaluating environmental impact documents.
5. To assess the air and water quality parameters; predict the impacts and their mitigation measures.

UNIT - I:

Basics concepts of EIA: Initial environmental examination, elements of EIA, factors affecting EIA, impact evaluation and analysis, preparation of environmental base map, classification of environmental parameters.

EIA Methodologies: Introduction, Criteria for the selection of EIA methodology, EIA methods, Ad-hoc methods, matrix methods, network method, Environmental Media Quality Index Method (EMQI), Environmental media quality index method, overlay methods, cost/benefit analysis.

UNIT - II:

Impact of developmental activities and land use: Introduction and methodology for the assessment of soil and groundwater, delineation of study area, identification of of activities. Assessment of impact of developmental activities on vegetation and wildlife, environmental impact of deforestation- causes and effects of deforestation.

UNIT - III:

Procurement of relevant soil quality, impact prediction, assessment of impact significance, identification and incorporation of mitigation measures.

EIA of 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 - IV:

Environmental audit and environmental legislation, objectives of environmental audit, types of environmental audit, audit protocel, stages of environmental audit onsite activities, evaluation of audit data and preparation of audit report, post audit activities.

UNIT - V:

Environmental protection Act, The water Act, The air Act (prevention and control of pollution Act), motor act, wild life act. Case studies of preparation of EIAs for various industries.

Text Books:

1. Environmental impact assessment methodologies, by Y.Anjaneyulu, B.S.Publication, Sultan bazaar Hyderabad.
2. Environmental impact assessment, by Alan Gilpin, Cambridge University Press

Reference Books:

1. Environmental pollution Control by Dr. H S Bhatia – Galgotia Publications Pvt Ltd, Delhi.
2. Environmental Impact Assessment and Management Publisher, Daya Author: B Hoisetti, A Kumar

Course Outcomes:

The Students will be able to

1. Explain different methodologies for environmental impact prediction and assessment.
2. Understand the elements of environmental impact assessments and processes by which they apply.
3. Carry out scoping and screening of developmental projects for environmental and social assessments.
4. Evaluate EIA reports.
5. Plan EIAs and environmental management plans

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GREEN BUILDING TECHNOLOGY
(Open Elective-III)

COURSE OBJECTIVES: The objective of this course is to

1. Create awareness about the principles of green building technology and to have insight about the criteria for rating systems along with the established Indian codes and guidelines.
2. Establish a clear understanding of various renewable and non-renewable sources of energy along with their carbon foot prints and enumerates the process of performance testing including building modeling and energy analysis.
3. Discuss about the energy efficient green building materials and to have understanding on the cost-effective Building Technologies, Strategies for Green Building Systems and Energy Conservation Measures.
4. Give details on the principles of sustainable development in green building design.
5. Describe the best green building practices adopted along with cost/benefit and life-cycle analysis of green buildings.

UNIT-I

Concept of Green Buildings: Green building - Definition, Features, Necessity, Initiatives, Green buildings in India, Green building Assessment – Green Building Rating Systems (BREEAM, USGBC, LEED, IGBC, TERI-GRIHA, GREEN STAR), Criteria for rating, Energy efficient criteria, environmental benefits economic benefits, health and social benefits, Major energy efficiency areas for building, Contribution of buildings towards Global Warming. Life cycle cost of buildings, Codes and Certification Programs.

UNIT-II

Sources of Energy:

Renewable and Non-renewable sources of energy - Coal, Petroleum, Nuclear, Wind, Solar, Hydro, Geothermal sources, potential of these sources, hazards, pollution with reference to Global scenario, demand and supply in India, Global efforts to reduce carbon emissions, Performance testing. Building modeling- Energy analysis, Metering, Monitoring.

Carbon emission: Forecasting, Control of carbon emission, Air quality and its monitoring carbon foot print, Environmental issues, Minimizing carbon emission, Energy retrofits and Green Remodels.

UNIT-III

Green Building Materials: Sustainable Materials, Depletion of natural resources for preparation of building materials, renewable and recyclable resources, energy efficient materials, Embodied Energy of Materials. Green cement, Biodegradable materials, Smart materials, Manufactured Materials, Volatile Organic Compounds (Voc's), Natural Non-Petroleum Based Materials, Recycled materials, Renewable and Indigenous Building Materials, Engineering evaluation of these materials.

Green Building Planning and Specifications: Environment friendly and cost effective Building Technologies, Integrated Life cycle design of Materials and Structures, Green Strategies for Building Systems, Alternative Construction Methods, Energy Conservation Measures in Buildings, Waste and Water management and Recycling by Sustainable Facilities, Heating, Ventilation and Air Conditioning, Passive Solar and Daylight, Plumbing and its Effect on Energy Consumption

UNIT-IV

Design of Green Buildings; Sustainable sites, Impact of construction on environment, Life cycle assessment, Principles of sustainable development in Building Design, Design on Bioclimatic and solar passive architecture, Considerations of energy consumption, water use, and system reliability, indoor air quality, noise level, comfort, cost efficiency in building design, Advanced Green building technologies and innovations.

UNIT-V

Construction of Green Buildings: Energy efficient construction, Practices for thermal efficiency and natural lighting. Ecofriendly water proofing; Energy conservation building codes building rating, Maintenance of green buildings, Cost and Performance Comparisons and Benchmarking, Green Project Management Methods and Best Practices, Cost/benefit analysis of green buildings, Life-cycle analysis of green buildings, Case studies of rated buildings (new and existing)

TEXT BOOKS:

1. Alternative Building Materials and Technologies – By K S Jagadeesh, B V Venkata Rama Reddy & K S Nanjunda Rao – New Age International Publishers
2. Integrated Life Cycle Design of Structures – By AskoSarja – SPONPress
3. Non-conventional Energy Resources – By D S Chauhan and S K Sreevasthava – New Age International Publishers
4. Green Buildings (McGraw hill publication): by Gevorkian

REFERENCE BOOKS:

1. Emerald Architecture: case studies in green buildings, The Magazine of Sustainable Design
2. Understanding Green Building Guidelines: For Students and Young Professionals, Traci Rose Rider, W. W. Norton & Company Publisher.
3. Understanding Green Building Materials, Traci Rose Rider, W. W. Norton & Company Publisher.

List of free reference guides/resources available on the net:

1. IGBC reference guide
2. Free abridged versions of LEED reference guides
3. ECBC latest version
4. US GBC's Reference Material

COURSE OUTCOMES:

After completion of the course the student will be able to

1. Know the underlying principles, history, environmental and economic impacts of green building technology and to identify the criteria for rating systems along with the established Indian codes and guidelines.
2. Identify various Renewable and Non-renewable sources of energy along with their carbon foot prints and comprehend the techniques and benefits of building performance testing such as building modeling and energy analysis, monitoring and metering.
3. Recognize the energy efficient green building materials and explain the cost effective Building Technologies, Strategies for Green Building Systems and Energy Conservation Measures.
4. Identify and compare cost and performance of building materials with recycled components, non-petroleum-based materials, materials with low volatile organic compounds, materials with low embodied energy and salvaged materials and incorporate them into design.
5. Explain the application of design guidelines of Green Building considering the Energy Conservation Measures.

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Materials in Electrical Systems

(Open Elective - III)

UNIT - I:

Materials- Conductors-free electron theory and electron scattering Di electrics Polarization, solid, liquid and gas dielectrics Insulators-Classification, Application in electric devices.

UNIT - II:

Magnetic materials-classification based on orientation of magnetic dipoles, Optoelectronic materials, Semiconductors-simple and compound, Refractory Materials. Solders and contacts, Super conductivity and super conducting materials.

UNIT - III:

Components- Resistors and Capacitors. Display units:-LED, LCD and Monitors. Effect of environment on components.

UNIT - IV:

Processes- Basic processes used in the manufacture of integrated circuits such as Epitaxy, masking, photolithography, diffusion, oxidation, Etching, metallization, Scribing, wire bonding and Encapsulation. Induction and Dielectric heating. Electron beam welding and cutting.

UNIT - V:

Cables- Calculations of capacity of cables, charging current, stress, grading, heating of cables, Construction and characteristics of HV & EHV cable

Text Books:

1. S.O. Kasap, Principles of Electrical Engineering Materials," MGH.
2. Mahajan, Principles of growth and processing of semiconductors," MGH.

References Books:

1. Dhir, Electronic components and Materials Principles manufacturing and Maintenance," TMH.
2. Allison, „Electronic Engineering Materials and Devices," TMH.
3. Ruska N Scot, Microelectronic processing – an introduction to the manufacture of integrated circuits," MGH.
4. Decker, Electrical Engineering Materials," PHI.

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Field Theory and Circuits
(Open Elective - III)

UNIT - I: Field Theory:
Review of Vector Analysis- Coordinate Systems, Vectors, gradient, divergence, curl, Laplacian, divergence theorem, Stoke‟s theorem.

UNIT - II:
Electric and Magnetic fields- Electric fields due to distributed charges configurations line(s) of charges, uniform plane surface and spherical volume charge distributions; behavior of conductors and dielectrics in electrostatic fields, boundary conditions, applications of ampere‟s law and Biot- Savart‟s law; capacitance and inductance calculations for simple configurations; time varying fields – displacement current, Maxwell‟s equations; Laplace‟s and Poisson‟s equations.

UNIT - III: Circuit Theory:
Classification of circuits, sources and signals, standard signals, source transformations. Network topology, graph matrices, formulation and solution of circuit equations based on graph theory using different analysis techniques- circuit, cut set and mixed. Concept of duality.

UNIT - IV:
Network theorems and their applications-Superposition, reciprocity, Thevenin, Norton, Maximum power transfer, Millman, Substitution, Compensation and Tellegan‟s theorem. Analysis of circuits subject to periodic and non-periodic excitations using Fourier series and Laplace transforms.

UNIT - V:
Concept of free and forced response of circuits. Time constants and Transient response under d.c. and a. c. excitation. Analysis of magnetically coupled circuits. Analysis of circuits with dependent sources.

Text Books:

1. N.N. Rao, „Basic Electromagnetic with applications‟, PHI
2. Desoer & Kuh, — Basic Circuit theory‖, McGraw Hill.

References Books:

1. E.C. Jordan and K.G. Balmain, „Electromagnetic waves and radiating systems‟, PHI
2. D.J. Griffith, „Introduction to Electrodynamics‟, PHI .
3. Guru & Hiziroglu, „ Electromagnetic field theory fundamentals‟, Vikas Publishing House
4. Van Valkenberg , —Network Analysis‖, PHI.
5. Valkenberg & Kinariwala , —Linear Circuits‖, PHI.
6. Trick , —Introduction to circuit Analysis‖, Wiley.
7. Roy Choudhary , —Networks & systems‖, Wiley.

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RELIABILITY ENGINEERING

(OPEN ELECTIVE-III)

Course Objectives:

The student will

1 Know the micro systems and its manufacturing techniques.

2 Understand the working of micro sensors and actuators.

3 Design Microsystems

Course Outcomes:

The student will be able to

1 Overview of micro systems and explain the micro manufacturing techniques.

2 Discuss the principles and types of micro sensors and actuators.

3 Understand the fundamentals of micro fluidics and design Microsystems.

UNIT - I

Basics concepts of reliability: Introduction, Reliability and quality, Failures and failure modes, Causes of failures and reliability, Maintainability and availability, History of reliability, reliability literature.

Reliability mathematics: Introduction, Random experiment , Probability , Random variables, Distribution functions, Discrete distribution ,Continuous distribution, Numerical characteristics of random variables , Laplace transform.

UNIT- II

Component reliability and hazard models: Introduction, Component reliability from test data, Mean time to failure, Time – dependent hazard models, Stress- Dependent hazard models, Derivation of reliability function using Markov, Treatment of field data.

System reliability models: Introduction - Systems with component within series - Systems with parallel components - k-out – of- m systems - Non series parallel systems - Systems with - mixed – mode failures - Fault- tree technique

UNIT- III

Maintainability and availability concepts: Introduction - Maintainability function - Availability function - Frequency of failures - Two-unit parallel systems with repair - k-out- of-m systems - Preventive maintenance.

Reliability improvement: Introduction - Improvement components - Redundancy - Element redundancy - Unit redundancy - Stand by redundancy - Optimization - Reliability – cost trade – off.

UNIT- IV

Economics of reliability engineering: Economic issues - Manufacture's cost - Customer's cost - Reliability achievement cost - models - Reliability utility cost models - Depreciation cost models - Availability – cost – model of parallel systems

UNIT- V

Reliability management: Reliability programming - Management policies and decision - Reliability management by objectives - Reliability group - Reliability data: Acquisition and analysis - Managing people for reliability.

TEXT BOOKS;

1. Reliability Engineering: Balaguruswamy, Tata McGrawHill
2. Reliability Engineering: L.B.Srinath, East West Publications.

REFERENCE BOOKS:

1. Reliability Engineering: Patrick DTO, Wiley Conor-India
2. Reliability Engineering and life testing, Naikan-PHI Publications.

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SPECIAL MANUFACTURING PROCESS
(OPEN ELECTIVE-III)

Course Objectives:
The Student will :

1. To expose the students to a variety of manufacturing processes including their typical use and capabilities.
2. To teach the important effects that manufacturing processes may have on the material properties of the processed part with a focus on the most common processes.
3. To teach the thermal and mechanical aspects, such as force, stress, strain, and temperature, of the most common processes.
4. To provide a technical understanding of common processes to aid in appropriate process selection for the material and required tolerances
5. To provide a technical understanding of common processes to aid in appropriate material selection for a predetermined process

UNIT I: Casting: Steps involved in making a casting – Advantage of casting and its applications; Patterns – Pattern making, Types, Materials used for patterns, pattern allowances and their construction; Properties of moulding sands. Methods of Melting – Crucible melting and cupola operation – Defects in castings; Casting processes – Types – Sand moulding, Centrifugal casting, die- casting, Investment casting, shell moulding; Principles of Gating – Requirements – Types of gates, Design of gating systems – Riser – Function, types of Riser and Riser design. Solidification of casting – Solidification of pure metal – Nucleation and grain growth, casting design considerations.

UNIT II: Welding: Classification – Types of welds and welded joints; Gas welding – Types, oxy-fuel gas cutting – standard time and cost calculations. Arc welding, forge welding, submerged arc welding, Resistance welding, Thermit welding.

UNIT III: Inert Gas Welding _ TIG Welding, MIG welding, Friction welding, induction welding, explosive welding, Laser Welding; Soldering and Brazing; Heat affected zone in welding. Welding defects – causes and remedies; destructive and non- destructive testing of welds.

UNIT IV: Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth. Rolling fundamentals – theory of rolling, types of Rolling mills and products. Forces in rolling and power requirements Stamping, forming and other cold working processes. Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning. Types of presses and press tools. Forces and power requirement in the above operations.

UNIT V: Extrusion of Metals: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion – Forward extrusion and backward extrusion – Impact extrusion – Extruding equipment – Tube extrusion and pipe making, Hydrostatic extrusion. Forces in extrusion Forging Processes: Forging operations and principles – Tools – Forging methods – Smith forging, Drop Forging – Roll forging – Forging hammers: Rotary forging – forging defects – cold forging, swaging, Forces in forging operations.

TEXT BOOKS :

1. Manufacturing Technology / P.N. Rao Vol.1 & 2 / Mc Graw Hill
2. Manufacturing Engineering & Technology / Serope Kalpakjian / Steven R. Schmid /Pearson

REFERENCES:

1. Metal Casting / T.V Ramana Rao / New Age
2. Production Technology / G. Thirupathi Reddy / Scitech

Course outcomes:

The student will be able to:

1. Understand the idea for selecting materials for patterns. Types and allowances of patterns used in casting and analyze the components of moulds.
2. Design core, core print and gating system in metal casting processes
3. Understand arc, gas, solid state and resistance welding processes.
4. Develop process-maps for metal forming processes using plasticity principles.
5. Identify the effect of process variables to manufacture defect free products

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PRINCIPLES OF COMPUTER COMMUNICATION AND NETWORKS

(Open Elective-III)

Course Objectives:

1. To understand the Analog and Digital Communication concepts.
2. To understand the concept of computer communication.
3. To learn about the networking concept, layered protocols.
4. To understand various communications concepts.
5. To get the knowledge of various networking equipments.

UNIT-I

Analog and Digital Communication Concepts: Representing data as analog signals, representing data as digital signals, data rate and bandwidth reduction, Digital Carrier Systems.

UNIT II

Overview of Computer Communications and Networking: Introduction to Computer Communications and Networking, Introduction to Computer Network, Types of Computer Networks, Network Addressing, Routing, Reliability, Interoperability and Security, Network Standards, The Telephone System and Data Communications.

UNIT III

Essential Terms and Concepts: Computer Applications and application protocols, Computer Communications and Networking models, Communication Service Methods and data transmission modes, analog and Digital Communications, Speed and capacity of a Communication Channel, Multiplexing and switching, Network architecture and the OSI reference model.

UNIT IV

Physical and data link layer Concepts: The Physical and Electrical Characteristics of wire, Copper media, fiber optic media, wireless Communications. Introduction to data link Layer, the logical link control and medium access control sub-layers.

UNIT V

Network Hardware Components: Introduction to Connectors, Transreceivers and media convertors, repeaters, network interference cards and PC cards, bridges, switches, switches Vs Routers.

TEXT BOOKS:

1. Computer Communications and Networking Technologies, Michel A. Gallo and William H. Hancock, Thomson Brooks / Cole.
2. Data Communications and Networking – Behrouz A. Forouzan, Fourth Edition MC GRAW HILL EDUCATION, 2006.

REFERENCE BOOKS:

1. Principles of Computer Networks and Communications, M. Barry Dumas, Morris Schwartz, Pearson.
2. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 3rd Edition, Pearson Education.

Course Outcomes: The student will be able to

1. explain the networking of computers and data transmission between computers.
2. exposure about the various communication concepts.
3. get awareness about the structure and equipment of computer network structures.
4. illustrate the Physical and data link layer concepts.
5. get knowledge about network hardware components.

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SPEECH PROCESSING
(Open Elective-III)

Course Objectives:

1. To introduce speech production and related parameters of speech.
2. To show the computation and use of techniques such as short time Fourier transform, linear predictive coefficients and other coefficients in the analysis of speech.
3. To understand different speech modeling procedures such as Markov and their implementation issues.
4. To understand the basic concepts of speech recognition.
5. To gain knowledge on speech synthesis.

UNIT- I :BASIC CONCEPTS:
Speech Fundamentals: Articulatory Phonetics – Production and Classification of Speech Sounds; Acoustic Phonetics – acoustics of speech production; Review of Digital Signal Processing concepts; Short-Time Fourier Transform, Filter-Bank and LPC Methods.

UNIT- II: SPEECH ANALYSIS:
Features, Feature Extraction and Pattern Comparison Techniques: Speech distortion measures – mathematical and perceptual – Log Spectral Distance, Cepstral Distances, Weighted Cepstral Distances and Filtering, Likelihood Distortions, Spectral Distortion using a Warped Frequency Scale, LPC, PLP and MFCC Coefficients, Time Alignment and Normalization – Dynamic Time Warping, Multiple Time – Alignment Paths.

UNIT- III: SPEECH MODELING:
Hidden Markov Models: Markov Processes, HMMs – Evaluation, Optimal State Sequence – Viterbi Search, Baum-Welch Parameter Re-estimation, and Implementation issues. Speech Recognition: Large Vocabulary Continuous.

UNIT- IV: SPEECH RECOGNITION:
Architecture of a large vocabulary continuous speech recognition system – acoustics and language models – ngrams, context dependent sub-word units; Applications and present status.

UNIT –V: SPEECH SYNTHESIS:
Text-to-Speech Synthesis: Concatenative and waveform synthesis methods, sub word units for TTS, intelligibility and naturalness – role of prosody, Applications and present status.

Text Books:

1. Lawrence Rabiner and Biing-Hwang Juang, “Fundamentals of Speech Recognition”, Pearson education, 2003.
2. Daniel Jurafsky and James H Martin, “Speech and Language Processing – An Introduction to Natural language Processing, Computational Linguistics, and Speech Recognition”, Pearson Education, 2002.

References:

1. Steven W. Smith, “The Scientist and Engineer‟s Guide to Digital Signal Processing”, California Technical Publishing, 1997.
2. Thomas F Quatieri, “Discrete-Time Speech Signal Processing – Principles and Practice”, Pearson Education, 2004.

Course Outcomes:

Upon completion of the course, students will be able to:

1. model speech production system and describe the fundamentals of speech.
2. extract and compare different speech parameters.
3. choose an appropriate statistical speech model for a given application.
4. design a speech recognition system.
5. use different speech synthesis techniques.

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SOFT COMPUTING
(Open Elective-III)

Course Objectives:
Student will:

1. Classify the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications
2. Develop the understanding concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic.
3. To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering.
4. Decribe fuzzy systems with membership functions
5. Determine the genetic algorithms, its applications and advances.

UNIT-I:
Introduction: Neural Networks, Fuzzy Logic, Genetic Algorithms, Hybrid Systems, Soft Computing, Soft Computing Constituents, Soft Computing Characteristics. Artificial Neural Networks: Introduction, Fundamental Concept, Evolution of Neural Networks, Basic models of ANN, Important Terminologies.

UNIT-II:
Supervised Learning Networks : Introduction, Perceptron Networks, Adaptive Linear Neuron, Back propagation Network. Associative Memory Networks : Introduction, Training Algorithms for pattern association and Hopfield Networks.

UNIT-III:
Unsupervised Learning Network : Introduction, Fixed Weight Competitive Nets, Kohonen Self-Organizing Feature Maps, Counter Propagation Networks.
Fuzzy Sets : Introduction, Classical Sets, Fuzzy Sets, Classical Relations, Fuzzy Relations

UNIT-IV:
Membership functions- Features, Fuzzification, Membership value assignments, Defuzzification Methods, Fuzzy Arithmetic, Fuzzy Measures, Fuzzy Inference Systems, Fuzzy Logic Control Systems

UNIT-V:
Genetic Algorithms- Introduction, Basic operators and terminology, Traditional Algorithm vs Genetic Algorithm, Simple GA, General GA, Classification of GA, Genetic Programming, Applications of GA.
Applications of Soft Computing : Internet Search Technique, Hybrid Fuzzy Controllers.

TEXT BOOKS:

1. Principles of Soft Computing- S N Sivanandam, S N Deepa, Wiley India, 2007
2. Neuro-Fuzzy and Soft Computing A Computational Approach to Learning and Machine Intelligence – J.S.R.Jang, C.T.Sun, E.Mizutani, PHI 177

REFERENCE BOOKS:

1. Artificial Intelligence and Soft Computing- Behavioral and Cognitive Modeling of the Human Brain- Amit Konar, CRC press, Taylor and Francis Group.
2. Soft Computing and Intelligent System Design -Fakhreddine O Karray, Clarence D Silva,. Pearson Edition, 2004.
3. Artificial Intelligence – Patric Henry Winston – Third Edition, Pearson Education.

Course Outcomes:

Student will able to:

1. Learn about soft computing techniques and their applications
2. Analyze various neural network architectures
3. Apply perceptrons and counter propagation networks.
4. Define the fuzzy systems
5. Analyze the genetic algorithms and their applications

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E-COMMERCE
(Open Elective-III)

Course objectives:

1. Gain knowledge about the main objective and at the same time need is transaction on your web store. Of, course if you are selling products online what you require are customers. If you are getting good reach ability then your business will definitely grow. Therefore one of the objectives is high reachability.
2. Solve conversions i.e., if people are coming on your web store and purchasing something then it will calculate as conversions and from the number of people who are buying stuff from your web store we can calculate the conversion rate.
3. Provide customer satisfaction i.e., customer is the main part of any e-commerce business so it's very important to make your customer happy and satisfied by providing quality and desirable products, on time delivery, 24*7 customer support, and timely sale & best deal offers you can make your customer happy. It is one of the main objectives of e-commerce.
4. Receive social popularity i.e., unless and until you are not famous and popular among people you cannot establish your brand. Social presence with omni channel and digital marketing is essential for any e-commerce business.
5. Know about Consumer Search and Resource Discovery.

UNIT-I:
Introduction, Electronic Commerce Framework, The Anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications.

UNIT-II:
Consumer Oriented Applications, mercantile process models, mercantile models from the consumer's perspective, Mercantile from the merchant's perspective.
Types of Electronic Payment Systems, Digital Token-Based Electronic Payment Systems, Smart Cards & Electronic Payment Systems, Credit Card- Based Electronic Payment Systems, Risk & Electronic Payment Systems, Designing Electronic Payment Systems.

UNIT-III:
Electronic Data Interchange, EDI Applications in Business, EDI implementation, MIME, and value added networks.
Intra organizational E-Commerce, Macro forces and Internal Commerce, Work flow automation and Coordination, Customization and Internal Commerce, Supply Chain Management(SCM).

UNIT-IV:
Making a business case for a Document Library, Digital document types, Corporate Data warehouses, Advertising and Marketing, the new age of Information Based Marketing, advertising on Internet, charting the Online marketing process, Market Research.

UNIT-V:

Consumer Search and Resource Discovery, information search and Retrieval, Electronic commerce catalogs or directories, Information Filtering.

Multimedia and Digital video, Key Multimedia concepts, Digital Video & Electronic Commerce, Desktop Video Processing, Desktop Video Conferencing.

Text Books

1. "Frontiers of electronic commerce" – Kalakota, Whinston, Pearson
2. "E-Commerce", S.Jaiswal – Galgotia

References

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison-Wesley.
2. Goel, Ritendra "E-commerce", New Age International
3. Laudon, "E-Commerce: Business, Technology, Society", Pearson Education

Course outcomes:

1. Demonstrate an understanding of the foundations and importance of e-commerce.
2. Demonstrate an understanding of retailing in e-commerce by:
    a. Analyzing branding and pricing strategies,
    b. Using and determining the effectiveness of market research.
    c. Assessing the effects of disintermediation.
3. Analyze the impact of e-commerce on business models and strategy.
4. Describe internet trading relationships including business-to-business, intraorganizational.
5. Describe the infrastructure for E-Commerce.

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IV Year – II Semester	**3**	**0-0-0**	**3**

INTERNET OF THINGS
(Open Elective-III)

Course Objectives

1. Understand the current vision of the Internet of Things and its impact on the world
2. Classify basic concepts of IoT and M2M &IoT system management
3. Describe concepts of python language and different python packages.
4. Explain how to design IoT Physical devices with built-ins of python Programs
5. Identify the advanced concepts of IoT physical servers, cloud offerings.

UNIT-I:

Introduction to Internet of Things –Introduction, Definition and Characteristics of IoT,
Physical Design of IoT – Things inIoT, IoT Protocols, Logical Design of IOT- IoT Functional Blocks,IoTCommunication Models, IoT Communication APIs
IoT Enabling Technologies – Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems
Domain Specific IoTs – Introduction, Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle.

UNIT-II:

IoT and M2M – Introduction,M2M,Difference between IOT and M2M,**SDN and NFV for IoT**-Software Defined Networking, Network Function Virtualization,
IoT System Management with NETCONF-YANG- Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Network Operator Requirements,NETCONF, YANG, NETOPEER.

UNIT-III:

IoT Systems-Logical Design Using Python-Introduction, Installing Python, Data types and Data Structures, Control Flow, Functions, Modules, Packages, File handling, Date/Time Operations, Classes.
Python Packages of Interest for IoT- JSON, XML, HTTPLib, URLLib, SMTPLib.

UNIT-IV:

IoT Physical Devices and Endpoints – What is an IoTDevice,Exemplary Device: Raspberry Pi,About the Board,Linux on Raspberry Pi, Raspberry PI-Interfaces (Serial, SPI, I2C),Programming
Raspberry Pi with Python-Controlling LED, interfacing an LED and Switch and interfacing a light sensor with Raspberry Pi,

UNIT-V:

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage Models and communication APIs.
WAMP-AutoBahn for IoT,Xively Cloud for IoT, Python web application framework
Designing a RESTful web API,

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

Course Outcomes

1. Analyze current vision of the Internet of Things and its impact on the world.
2. Demonstrate basic concepts of IoT and M2M &IoT system management
3. Practice the concepts of python language using different python packages
4. Design IoT Physical devices using python Programming.
5. Categorize advanced concepts of IoT physical servers, cloud offerings.

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IV Year II- Semester	**3**	**0-0-0**	**3**

SEMANTIC WEB AND SOCIAL NETWORKS

(Open Elective-III)

Course Objectives

1. Explain the fundamentals of Semantic Web technologies.
2. Explain the Implementation of semantic web applications and the architectures of social networking
3. Discuss which brings together forward looking research and technology that will shape our world more intimately than ever before as computing becomes an extension of human experience;
4. Discuss that covers all aspects of computing that is very closely tied to human perception, understanding and experience;
5. Discuss which brings together computing that deal with semantics, perception and experience and serves as the Plat form for exchange of both practical technologies and far reaching research.

UNIT I

Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web

Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee, www, Semantic Web Road Map, Logic on the semantic Web.

UNIT II

Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web - Resource Description Framework (RDF) / RDF Schema. Ontology Web Language (OWL), UML, XML and XML Schema.

Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping,

UNIT III

Logic, Rule and Inference Engines. Semantic Web applications and services. Semantic Search,e-learning, Semantic Bioinformatics, Knowledge Base

UNIT IV

XML Based Web Services, Creating an OWL-S Ontology for Web Services. Semantic Search Technology, Web Search Agents and Semantic Methods,

UNIT V

What is social Networks analysis, development of the social networks analysis.Electronic Sources for Network Analysis - Electronic Discussion networks.

Blogs and Online Communities. Web Based Networks. Building Semantic Web Applications with social network features.

TEXTBOOKS:

1. Thinking on the Web - Berners Lee.Godel and Turing,Wiley interscience,20()8.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

REFERENCE BOOKS:

1. Semantic Web Technologies,Trends and Research in Ontology Based Systems, J.Davies, Rudi Studer. Paul \Warren, John Wiley & Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Information Sharing on the semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.

Course Outcomes

1. Demonstrate knowledge and be able to explain the three different “named” generations of the web
2. Demonstrate the ability to participate materially in projects that develop Programmes relating to **Web** applications and the analysis of Web data.
3. Analyze key Web applications including search engines and social networking sites.
4. Illustrate the key aspects of Web architecture and why these are important to the continued functioning of the World Wide Web.
5. Analyze and explain how technical changes affect the social aspects of Web-based computing.

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FUNDAMENTALS OF INTELLIGENCE SYSTEMS

(OPENELECTIVE-III)

Course Objectives:

1. Understand In-depth of specialist bodies of knowledge within the engineering discipline.
2. Establish engineering methods to complex engineering problem solving.
3. Be Fluent application of engineering techniques, tools and resources .
4. Learn the difference between optimal reasoning vs human like reasoning.
5. Understand the notions of state space representation, exhaustive search, heuristic search along with the time and space complexities

UNIT–I:

Introduction to Artificial Intelligence: Introduction to AI-Problem formulation, Problem Definition -Production systems

Control strategies, Search strategies. Problem, characteristics, Production system characteristics -Specialized production system

UNIT–II:

Representation of Knowledge: Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution

Use of predicate calculus, Knowledge representation using other logic Structured representation of knowledge.

UNIT–III:

Knowledge Inference: Knowledge representation Production based system, Frame based system

UNIT–IV:

Inference - Backward chaining, forward chaining, Rule value approach Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.

UNIT-V:

Expert Systems: Expert systems - Architecture of expert systems

Roles of expert systems - Knowledge Acquisition –Meta knowledge, Heuristics.

Text Books:

1. Kevin Night, Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Tata McGraw-Hill Education Private Limited, 3rd edition, 2009, ISBN: 978-0070678163.
2. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2nd edition, 2007.ISBN, 0132097680.

Course Outcomes:

1. Gain basic understanding of the underlying principles and philosophy of computational intelligence systems Technologies.
2. Be capable of constructing intelligent systems (in software) that perform useful engineering tasks.
3. Possess the ability to formulate an efficient problem space for a problem expressed in English.
4. Possess the ability to select a search algorithm for a problem and characterize its time and space complexities.
5. Possess the skill for representing knowledge using the appropriate technique.

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INTRODUCTION TO NEURAL NETWORKS

(OPEN ELECTIVE-III)

Course Objectives:

1. Understand the differences and similarities neural network, human brain and feedback systems
2. Learn the different learning techniques
3. Familiar with the concept of single layer perceptron and its algorithms.
4. Familiar with the concept of multilayer perceptron and its algorithms
5. Know the self-organisation mapping techniques.

UNIT–I:

Introduction: What is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs

Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks.

UNIT–II:

Learning Process: Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning

Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process.

UNIT–III:

Single layer perceptrons: Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves

Learning rate annealing techniques, perception-convergence theorem, Relation between perception and Bayes classifier foe a Gaussian Environment.

UNIT–IV:

Multilayer Perceptrons: Back propagation algorithm XOR problem

Heuristics, Output representation and decision rule, computer experiment, feature detection.

UNIT-V:

Self –Organization Maps: Two basic feature mapping models, Self-Organization maps, SOM algorithm.

Hopfield models: Hopfield models, computer experiment.

Text Books:

1. Neural networks A comprehensive foundation, Simon Haykin, PHI edition.
2. Artificial neural networks- B. Vegnanarayana Prentice Halll of India P Ltd 2005.

Reference Books:

1. Neural networks in Computer intelligence, Li Min Fu TMH 2003.
2. Neural networks James A Freeman David M S kapura. Pearson education 2004.

Course Outcomes:

1. Know differences and similarities between neural network, human brain and feedback systems
2. Get the knowledge of different learning techniques
3. Describe the concept of single layer perceptron and its algorithms.
4. Describe the concept of multilayer perceptron and its algorithms.
5. Analyse the self-organisation mapping techniques.