CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

1.0 Under-Graduate Degree Programme in Engineering & Technology

CMR College of Engineering & Technology, Hyderabad offers 4 Years (8 Semesters) Bachelor of Technology (B.Tech.) degree Programme, under Choice Based Credit System (CBCS), with effect from the Academic Year 2018 - 19 and onwards, in the following Branches of Engineering.

S.No.	Branch
I.	Civil Engineering
II.	Electrical & Electronics Engineering
III.	Mechanical Engineering
IV.	Electronics & Communication Engineering
V.	Computer Science & Engineering

2.0 Admission Procedure

2.1. Admissions will be done as per the norms prescribed by the Government of Telangana. The Government orders in vogue shall prevail.

2.2. The candidate should have passed the qualifying examination Intermediate or equivalent on the date of admission.

2.3. Seats in each program in the college are classified into Category–A(70%ofintake) and Category-B (30%of intake) besides Lateral Entry. Category-A seats will be filled by the Convener, TS EAMCET Admissions. Category-B seats will be filled by the College as per the guidelines of the Competent Authority.

2.4. Lateral Entry seats for 20% of the candidates from the approved strength of the course shall be admitted into the III Semester directly based on the rank secured by the candidate in TSECET in accordance with the guidelines from the Competent Authority.

2.5 The medium of instruction for the entire UG Degree Course in Engineering & Technology (E&T) shall be ENGLISH only.

3.0 B.Tech. Degree Course Structure

3.1 The B.Tech. Programmes of CMR College of Engineering & Technology are of semester pattern, with 8 Semesters constituting 4 Academic Years, each Academic Year having two Semesters (First/Odd and Second/Even). Each Semester shall have a minimum of 90 Instructional Days.

3.2 UGC/ AICTE specified Definitions/ Descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations/ Norms, which are as listed below. The Course Structure is organized based on the AICTE Model Curriculum for Under-Graduate Degree Courses in Engineering & Technology (Jan. 2018).

3.2.1 Semester Scheme:

Each UG Programme is of 4 Academic Years (8 Semesters), with the year being divided into two Semesters of minimum 90 Instructional days/Semester and in addition each Semester having - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as denoted by UGC, and Curriculum/ Course Structure as suggested by AICTE are followed.

3.2.2 Course Credits:

The Courses are to be registered by a student in a Semester to earn Credits. Credits shall be assigned to each Course in a L: T: P: C (Lecture Periods: Tutorial Periods: Practical's Periods: Credits) Structure, based on the following general pattern.

- One Credit - for One hour/ Week/ Semester for Theory/ Lecture (L)/Tutorial Courses; and,
- One Credit - for Two hours/ Week/ Semester for Laboratory/ Practical (P) Courses

Other student activities like NCC, NSS, NSO, Induction Program, Study Tour, Guest Lecture etc., and other Courses identified as Mandatory Courses (MC) shall not carry Credits.

3.2.3 Course Classification:

All Courses offered for the UG Programme are broadly classified

as:

(a) Foundation Courses (Fn C)
(b) Core Courses (Co C)
(c) Elective Courses (Eℓ C)

- **Foundation Courses** (Fn C) are further categorized as:
    i. HSMC (Humanities, Social Sciences and Management Courses)
    ii. BSC (Basic Science Courses)
    iii. ESC (Engineering Science Courses)
- **Core Courses (**Co C) and Elective Courses (Eℓ C) are categorized as PS (Professional Subjects), which are further subdivided as –
    i. PCC (Professional Core Courses)
    ii. PEC (Professional Elective Courses)
    iii. OEC (Open Elective Courses)
    iv. PROJ (Project)
- **Minor Courses** (1 or 2 Credit Courses, belonging to HSMC/ BSC/ ESC/ PCC as per relevance); and
- **Mandatory Courses** (MC - Non-credit oriented).

3.2.4 Course Nomenclature:

The Curriculum Nomenclature or Course-Structure Grouping or the each of the UG PROGRAMME E&T (B.Tech. Degree Programmed), is as listed below:

S. No.	*Broad Course Classificati-on*	*Course Group/ Category*	*Course Description*	*Suggested Breakup of Credits by AICTE(160)*
1	**Foundation Courses (Fn C)**	**BSC – Basic Science Courses**	Includes - Mathematics, Physics and Chemistry Subjects	**25***
2		**ESC - Engineering Science Courses**	Includes fundamental engineering subjects	**24***
3		**HSMC – Humanities and Social Sciences**	Includes subjects related to Humanities, Social	**12***

		including Management Courses	Sciences and Management	
4	**Core Courses (Co C)**	**PCC– Professional Core Courses**	Includes core subjects related to the Parent Discipline/ Department/ Branch of Engg.	**48***
5	**Elective Courses (Eℓ C)**	**PEC – Professional Elective Courses**	Includes Elective subjects related to the Parent Discipline/ Department/ Branch of Engg.	**18***
6		**OEC – Open Elective Courses**	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the Parent Discipline/ Department/ Branch of Engg.	**18***
7	**Core Courses**	**Project**	B.Tech. Project or UG Project or UG Major Project	**15***
8		**Industrial Training/ Mini-Project**	Industrial Training/ Internship/ UG Mini-Project/ Mini-Project	
9		**Seminar**	Seminar/ Colloquium based on core contents related to Parent Discipline/ Department/ Branch of Engg.	
10		**Mandatory Courses (MC)**	Mandatory Courses (non-credit)	**Nil**
Total Credits for B. Tech. Programme				**160**

* Minor variation is allowed as per need of the respective disciplines.

4.0 Course Work

4.1 A student, after securing admission, shall pursue the B.Tech. UG Programme in a minimum period of 4 Academic Years, and a maximum period of 8 Academic Years (starting from the Date of Commencement of I Year).

4.2 As suggested by AICTE, 'Mandatory Induction Programme' shall be offered for all the Branches of Engineering at the start of the I Year UG Degree Course, to enable the newly admitted students get acquainted with the new professional environment, to develop awareness and understanding of the engineering education requirements, and to get them prepared for the academic schedules ahead. The features, activities and pattern of the Induction Programme shall be as per the guidelines suggested in the AICTE Model Curriculum.

4.3 Each student shall Register for and Secure 160 Credits for the completion of the UG Programme and the Award of the B.Tech. degree in the respective branch of Engineering.

5.0 Course Registration

5.1 A 'Faculty Advisor or Counselor' shall be assigned to each student, who will advise him about the UG Programme, its Course Structure and Curriculum, Choice/Option for Subjects/ Courses for the purpose of registration, based on his competence, progress, pre-requisites and interest.

5.2 The Academic Section of the College invites 'Registration Forms' from students apriorie (before the beginning of the Semester), through 'on-line submissions', 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'.

5.3 Students are advised to individually register for all the number of credits indicated in that semester workload of the respective UG Degree Course Structure - this is termed as the 'Semester Work Load' (SWL).

5.4 A student can apply for ONLINE Registration, ONLY AFTER obtaining the 'WRITTEN APPROVAL' from his assigned Faculty Advisor, which should be submitted to the College Academic/Examination Section through the Head of the Department (a copy of the same is to be retained by the Head of the Department, Faculty Advisor and the student).

5.5 A student may be permitted to register for the courses in a semester of his choice subject to para 5.4 with the typical work load suggested in the course structure of that semester. A student may register for courses over and above the courses listed in the course structure of the semester with possible additional courses of his choice, limited to a maximum of 3 Credits, based on his PROGRESS and SGPA/ CGPA, and completion of the 'PRE-REQUISITES' as indicated for various Subjects/ Courses in the Department Course Structure and Syllabus contents.

5.6 The choice for the 'additional' Courses above the typical SWL must be indicated clearly, which needs the specific approval and signature of the Faculty Advisor/ Counselor and the HoD on the hard-copy.

5.7 If the Student submits ambiguous choices or multiple options or erroneous entries - during On-Line Registration for the 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, as applicable.

5.8 The Course Options exercised through 'ON-LINE' Registration are final and CANNOT be changed; further, alternate choices will also not be considered. However, if the Course that has already been listed for Registration (by the Head of Department) in a Semester and 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 Course (subject to offering of such a Course), or for another existing Course (subject to availability of seats), which may be considered. Such alternate arrangements will be made by the

Head of the Department, with due notification and time-framed schedule, within the FIRST WEEK from the commencement of Class-work for that Semester.

5.9 Dropping of the Courses may be permitted ONLY AFTER obtaining the prior approval from the Faculty Advisor assigned and the Head of the department (subject to the retaining of the SWL), 'within 15 Days of Time' from the beginning of the current semester.

5.10 For Mandatory Courses like NCC/ NSS/ NSO etc., a 'Satisfactory Participation Certificate' from the concerned authorities for the relevant Semester is essential. No Marks or Grades or Credits shall be awarded for these activities.

6.0 Courses to be offered

6.1 A typical Section (or Class) Strength for each Semester shall be 60.

6.2 An Elective course may be offered to the Students, ONLY IF a Minimum of 20 Students (1/3 of the Section Strength) opt for the same. The Maximum Strength of a Section is limited to 80 (60 + 1/3 of the Section Strength).

6.3 More than one teacher may offer the same Course (Laboratory/ Practicals may be included with the corresponding Theory Course in the same Semester) in any Semester. However, selection choice for students will be based on - 'first come 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). The decision of the Head of the department in this regard is final.

6.4 If more entries for Registration of a course come into picture, the Head of the Department shall decide on offering of such a Course.

7.0 Attendance Requirements

7.1 A student shall be eligible to appear for the End Semester Examinations, if he acquires a minimum of 75% of attendance in aggregate of all the Courses (excluding Mandatory or Non-Credit Courses) for that Semester.

7.2 Condoning of shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each Semester may be granted by the College Academic Committee on genuine and valid medical grounds, based on the student's representation with supporting evidence.Provision of such condonation is however limited to a maximum of 3 times during the maximum permissible UG study period.

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

7.4 Shortage of Attendance below 65% in aggregate shall in NO case be condoned.

7.5 Students, whose shortage of attendance is not condoned in any Semester, are not eligible to appear for End Examinations of that Semester. Such students are 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 Courses registered in that Semester in which they got detained, by seeking re-admission for 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 Courses offered under that category.

8.0 Academic Requirements

The following Academic Requirements have to be satisfied, in addition to the Attendance Requirements mentioned in Item No.**7.**

8.1 A student shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to each Subject/ Course, if he secures not less than 35% marks (25 out of 70 marks)in the End Semester 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 '**P'** Grade or above in that Subject/ Course.

8.2 A student shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to Technical Seminars, if he secures not less than 40% of the total marks to be awarded. The student would be treated as failed, if he -

(i) does not present the technical Seminars as required in the VI and VIII Semesters, or
(ii) Secures less than 40% of marks in Technical Seminar Evaluations.

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

8.3 A Student will not be promoted from I Year to II Year, unless he fulfils the Attendance and Academic Requirements and secures a minimum of total 19 Credits of I Year, from all the relevant regular and supplementary examinations, whether he takes those examinations or not.

8.4 A Student will not be promoted from II Year to III Year, unless he fulfils the Attendance and Academic Requirements and secures a minimum of total 47 Credits up to IV Semester, from all the relevant regular and supplementary examinations, whether he takes those examinations or not.

8.5 A Student will not be promoted from III Year to IV Year, unless he fulfils the Attendance and Academic Requirements and secures a minimum of total 72 Credits up to VI Semester, from all the relevant regular and supplementary examinations, whether he takes those examinations or not.

8.6 A Student shall - register for all courses covering 160 credits as specified and listed (with the relevant Course Classifications as mentioned) in the course structure, put up all the Attendance and Academic requirements for 160 credits securing a minimum of 'P' Grade (Pass Grade) or above in

each Course, and 'earn All 160 credits securing SGPA ≥ 5.0 (in each Semester), and CGPA (at the end of each successive Semester) ≥ 5.0, to successfully complete the UG Programme.

8.7 If a student registers for any 'additional courses' (in the parent Department or other Departments/Branches of Engg.) other than those listed Subjects totaling to 160 Credits as specified in the Course Structure of his Department, the performances in those 'additional Courses ' (although evaluated and graded) shall not be taken into account while calculating the SGPA and CGPA. For such 'additional Courses ' registered, the % of marks and the Letter Grade alone shall be indicated in the Grade Card as a performance measure subject to the completion of the Attendance and Academic Requirements as stated under Clauses 7.0 and 8.1 – 8.7.

8.8 Students who fail to earn 160 credits as per the course structure, and as indicated above, within 8 Academic Years from the Date of Commencement of their I Year shall forfeit their seats in B.Tech. Programme and their admissions shall stand cancelled.

8.9 When a Student is detained due to shortage of attendance in any Semester, he may re-register for that Semester, as and when offered, with the Academic Regulations of the Batch into which he re-registers. However, no Grade Allotments or SGPA/ CGPA calculations will be done for that entire Semester in which he got detained.

8.10 When a Student is detained due to lack of Credits in any year, he may re-register for the next year, after fulfilment of the Academic Requirements, with the Academic Regulations of the Batch into which he re-registers.

8.11 A student who is eligible to appear in the End Semester Examination in any Course, but was absent for it or failed (thereby failing to secure P Grade or above), may reappear for that Course at the supplementary examination as and when conducted. In such cases, his Internal Marks (CIE) assessed earlier for that Course will be carried over, and added to the

Marks to be obtained in the supplementary examination, for evaluating his performance in that Course.

9.0 Evaluation - Distribution and Weightage of Marks

9.1 The performance of a student in each Semester shall be evaluated Subject-wise (irrespective of Credits assigned) with a maximum of 100 marks for Theory or Practical or Seminar or Drawing/Design or Minor Course or Major Project Phase-I or Major Project Phase-II. These evaluations shall be based on CIE (Continuous Internal Evaluation) and SEE (Semester End Examination), and a Letter Grade corresponding to the % marks obtained shall be given.

9.2 For Theory subjects 30 marks are allocated for Continuous Internal Evaluation. Continuous Internal Evaluation during a semester is based on two internal examinations conducted during the semester. 70 marks are allocated for the Semester End Examination SEE.

(a) Each internal examination consists of two parts, part-A consisting of 5 short answer questions carrying two marks each, Part-B consisting of 3 essay type questions carrying 5 marks each with a total duration of 1 hour 40 minutes. The essay paper shall contain one question from each unit with internal choice. While the first internal examination shall be conducted from 1 to 2.5 units of the syllabus, the second internal examination shall be conducted on 2.5 to 5 units. Five (05) marks are allocated for Assignment (as specified by the subject teacher concerned). There will be two assignments in the semester for each course consisting of 5 marks each. The first Assignment should be submitted before the conduct of the first internal examination and second Assignment should be submitted before the conduct of the second internal examination.

(b) The total marks secured by the student in each internal examination are evaluated for 30 marks. The final marks secured in internal evaluation by each candidate are arrived at by giving a weightage of 70% to the best secured

internal examination and 30% weightage to the least secured internal examination. A student who is absent from any assignment/ internal examination for any reason what so ever shall be deemed to have secured 'zero' marks in the test/ examination and no makeup test/ examination shall be conducted.

9.3 For Practical Subjects, there shall be a Continuous Internal Evaluation (CIE) during the Semester for 40 internal marks, and 60 marks are assigned for Laboratory/Practical End Semester Examination (SEE). Out of the 40 marks for internals, day-to-day work in the laboratory shall be evaluated for 30 marks; and for the remaining 10 marks - internal practical test shall be conducted by the concerned laboratory teacher. For Practical Subjects, the end semester examination SEE shall be conducted with an external examiner and the laboratory teacher. The external examiner from other institutions or industry shall be appointed by the Controller of Examinations.

9.4 For the subjects having design and / or drawing, (such as Engineering Graphics, AutoCAD, Engineering Drawing, Machine Drawing and Estimation etc.,) the internal evaluation carries 40 marks (the distribution is 20 marks for day-to-day work and 20 marks for internal examination)and 60 marks shall be for end semester examination.There shall betwo internal examinationsin a semester. The final marks secured by each candidate in the internal evaluation is arrived at by giving a weightage of 70% to the best secured internal examination and 30% weightage to the least secured internal examination.

9.5 **Open Electives (OE):**Students have to choose One OE-I and one OE-II during VII Semester, one OE-III and one OE-IV in VIII Semester from the list of Open Electives given. However, Students cannot opt for an Open Elective Course offered by their own (parent) Department, if it is already listed under any category of the Courses offered by parent Department in any Semester. The Courses offered under Open Electives in an academic year will be reviewed and finalized by the College Academic Committee before the commencement of the academic year.

9.6 There shall be a Mini-Project-I/ Internship-I, to be taken up in the college or industry during the summer vacation after IV Semester examination. The Mini-Project-I/ Internship-I shall be evaluated during the V Semester. The Mini-Project-I/Internship-I shall be submitted in a report form and should be presented before a committee, which shall be evaluated for Satisfactory or Non-satisfactory. The committee consists of Head of the Department, the supervisor of Mini-Project-I/Internship-I, a senior faculty member of the department.

9.7 There shall be a Mini-Project-II/ Internship-II, to be taken up in the college or industry during the summer vacation after VI Semester examination. The Mini-Project-II/ Internship-II shall be evaluated during the VII Semester.The Mini-Project-II/ Internship-II shall be submitted in a report form and should be presented before a committee, which shall be evaluated for Satisfactory or Non-satisfactory. The committee consists of Head of the Department, the supervisor of mini project, a senior faculty member of the department.

9.8 There shall be a Technical Seminar-I presentation in VI Semester. For the Technical Seminar-I, the student shall collect the information on a specialized topic related to his branch other than Mini projects-I & II/ Internships-I & II/ Major Projects Phase-I & II topic with due approval of the Head of the department and prepare a technical report and submit to the department. The presentation demonstrating understanding of the topic and technical report shall be evaluated by a Departmental committee consisting of the Head of the department, Technical Seminar-I supervisor and a senior faculty member from the department. The Technical seminar will be evaluated for 100 marks.There shall be no SEE or external examination for the Technical Seminar-I.

9.9 There shall be a Technical Seminar-II presentation in VIII Semester. For the Technical Seminar-II, the student shall collect the information on a specialized topic related to his branch other than the Mini projects-I & II/ Internships-I & II/ Major Projects Phase-I & II topic with due approval of the Head of the department and prepare a technical report and submit to the department. The presentation demonstrating understanding of the topic and technical report shall be evaluated by a Departmental committee consisting of the Head of the department, Technical Seminar-II supervisor and a senior faculty member from the department. The Technical Seminar-II will be evaluated for 100 marks.There shall be no SEE or external examination for the Technical Seminar-II.

9.10 Each student shall start the Project Work during the VII Semester as per the instructions of the Project Guide/ Project Supervisor assigned by the Head of the Department.

a) The Project Work shall be divided and carried out in 2 phases : Phase – I (Project-I) during VII Semester, and Phase – II (Project-II) during VIII Semester, and the student has to prepare two independent Project Work Reports – *one each during each phase.* First Report shall include the Project Work carried out under Phase – I, and the Second Report (Final Report) shall include the Project Work carried out under Phase – I and Phase – II put together. Phase – I and Phase – II of the Project Work shall be evaluated for 100 marks each.

b) Out of the total 100 marks allotted for each Phase of the Project Work, 40 marks shall be for the Continuous Internal Evaluation(CIE), and 60 marks shall be for the End Semester Viva-voce Examination (SEE). The marks earned under CIE for both Phases of the Project shall be awarded by the Project Guide/Supervisor (based on the continuous evaluation of student's performance during the two Project Work Phases/periods); and the marks earned under SEE shall be

awarded by the Project Viva-voce Committee/ Board (based on the work carried out, report prepared and the presentation made by the student at the time of Viva-voce Examination).

c) For the Project Phase - I, the Viva-voce shall be conducted at the end of the VII Semester, before the commencement of the semester End Examinations, at the Department Level by a Committee comprising of the HoD or One Professor and Supervisor (no external examiner), and the Project Phase – II Viva-voce (or Final Project Viva-voce) shall be conducted by a Committee comprising of an External Examiner, the Head of the Department and the Project Supervisor at the end of the VIII Semester, before the commencement of the semester End Examinations. The External Examiner shall be nominated by the CoE from the panel of 3 names of external faculty members (Professors or Associate Professors outside the College) submitted by the HoD.

d) If a student does not appear for any of the two Viva-Voce examinations at the scheduled times as specified above, he may be permitted to reappear for Project Phase-I and/or Project Phase-II Viva-voce examinations, as and when they are scheduled in that semester; if he fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester(s), as and when they are scheduled, as supplementary candidate. For the registration of Project Phase-II the student must have passed Project Phase-I.

9.11 For NSS/ NSO Mandatory Courses and/or any other Mandatory Non-Credit Course offered in a semester, a 'Satisfactory Participation Certificate' shall be issued to the student from the authorities concerned, only after meeting the minimum attendance requirements in the Course. No Marks or Letter Grade shall be allotted for the Mandatory Courses.

10. 0. Semester End Examination (SEE)

10.1. Theory Courses

The end semester examination will be conducted for 70 marks which

consist of Part-A and Part-B. The examination is for 3 hours duration. Question paper pattern is as follows.

Part-A: 20 Marks
There shall be 10 questions each carrying 2 Marks. (Two questions from each Unit)

Part-B: 50 Marks
There shall be 10 questions out of which 5 questions (Internal choice within a unit i.e. two questions from each unit out of which one question to be answered) are to be answered, each question carry 10 marks.

10.2. Laboratory Courses

Each laboratory course is evaluated for 60 marks. The examination shall be conducted by the laboratory teacher and one external examiner appointed by the Controller of Examinations from other institutions or industry in consultation with the Head of the Department.

10.3. Supplementary Examinations

The schedule for supplementary examinations shall be as notified by the institute from time to time.

10.4. For NCC/ NSS/ NSO types of Courses, and/or any other Mandatory Non-Credit Course offered in a Semester, a 'Satisfactory Participation Certificate' shall be issued to the Student from the concerned authorities, only after meeting minimum attendance requirements in the Course. No marks or Letter Grade shall be allotted for these activities and it will not be part of calculation of CGPA.

11.0. Grading Procedure

11.1. Marks will be awarded to indicate the performance of each student in each Theory Course, or Laboratory Course, or Technical Seminar, or Project etc., based on the % marks obtained in CIE + SEE (Continuous Internal Evaluation + Semester End

Examination). As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades (UGC Guidelines) and corresponding percentage of marks shall be followed …

% of Marks Secured (Class Intervals)	*Letter Grade (UGC Guidelines)*	*Grade Points*
100% or below but not less than 85% (≥ 85% , <= 100%)	**O (Excellent)**	**10**
Below 85% but not less than 70% (≥ 70% , < 85%)	**A (Very Good)**	**9**
Below 70% but not less than 60% (≥ 60% , < 70%)	**B (Good)**	**8**
Below 60% but not less than 55% (≥ 55% , < 60%)	**C (above Average)**	**7**
Below 55% but not less than 50% (≥ 50% , < 55%)	**D (Average)**	**6**
Below 50% but not less than 40% (≥ 40% , < 50%)	**P (Pass)**	**5**
Below 40% (< 40%)	**F (FAIL)**	**0**

11.2 A student obtaining F Grade in any Subject shall be considered 'failed' and will be required to reappear as 'Supplementary Candidate' in the Semester End Examination (SEE), as and when offered. In such cases, his Internal Marks (CIE Marks) in those Subject(s) will remain same as those he obtained earlier.

11.3. A Letter Grade does not imply any specific % of Marks.

11.4. In general, a student shall not be permitted to repeat any Course(s) only for the sake of 'Grade Improvement' or 'SGPA/ CGPA Improvement'. However, he has to repeat all the Courses pertaining to that Semester, when he is detained (as listed in Items 8.10- 8.11).

11.5. A student earns Grade Point (GP) in each Course, on the basis of the Letter Grade obtained by him in that Course (excluding Mandatory non-credit Courses). Then the corresponding 'Credit Points' (CP) are computed by multiplying the Grade Point with Credits for that particular Course.

Credit Points (CP) = Grade Point (GP) x Credits …. For a Course

11.6. The Student passes the Course only when he gets GP ≥ 5 (P Grade or above).

11.7. The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (ΣCP) secured from ALL Courses registered in a Semester, by the Total Number of Credits registered during that Semester. SGPA is rounded off to TWO Decimal Places. SGPA is thus computed as

$$\textbf{SGPA} = \{ \sum_{i=1}^{N} C_i G_i \} / \{ \sum_{i=1}^{N} C_i \} \text{ …. For each Semester,}$$

where **'i'** is the Course indicator index (takes into account all Courses in a Semester), 'N' is the no. of Courses 'REGISTERED' for the Semester (as specifically required and listed under the Course Structure of the parent Department), C_i is the no. of Credits allotted to the $\mathbf{i}^{th}$ Course, and G_i represents the Grade Points (GP) corresponding to the Letter Grade awarded for that $\mathbf{i}^{th}$ Course.

11.8. The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over 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 Second Semester onwards, at the end of each Semester, as per the formula

$$\text{CGPA} = \{ \sum_{j=1}^{M} C_j G_j \} / \{ \sum_{j=1}^{M} C_j \}$$ **… for all S Semesters registered (ie., upto and inclusive of S Semesters, S ≥ 2),**

Where 'M' is the Total no. of Courses (as specifically

required and listed under the Course Structure of the parent Department) the Student has 'REGISTERED' from the 1st Semester onwards up to and inclusive of the Semester S (obviously M > N), '**j**' is the Course indicator index (takes into account all Courses from 1 to S Semesters), C_j is the no. of Credits allotted to the **j**th Course, and G_j represents the Grade Points (GP) corresponding to the Letter Grade awarded for that **j**th Course. After registration and completion of I Year I Semester however, the SGPA of that Semester itself may be taken as the CGPA, as there are no cumulative effects.

11.9. For Merit Ranking or Comparison Purposes or any other listing, ONLY the 'ROUNDED OFF' values of the CGPAs will be used.

11.10. For Calculations listed in Item 11.5– 11.8, performance in failed Courses (securing F Grade) will also be taken into account, and the Credits of such Courses will also be included in the multiplications and summations. However, Non-Courses will not be taken into consideration.

12.0. Passing Standards:

12.1**.** A student shall be declared successful or 'passed' in a Semester, only when he gets a SGPA ≥ 5.00 (at the end of that particular Semester); and a student shall be declared successful or 'passed' in the entire UG PROGRAMME, only when he gets a CGPA ≥ 5.00; subject to the condition that he secures a GP ≥ 5 (P Grade or above) in every registered Course in each Semester (during the entire UG PROGRAMME) for the Degree Award, as required.

12.2. A Student shall be declared successful or 'passed' in any Non-Credit Course, if he secures a 'Satisfactory Participation Certificate' for that Mandatory Course.

12.3. 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, Grade Earned etc.), Credits earned, SGPA, and CGPA.

13.0. Declaration of Results

13.1 Computation of SGPA and CGPA are done using the procedure listed in 11.5 – 11.9.

13.2. For Final % of Marks equivalent to the computed final CGPA, the following formula may be used …

% of Marks = (final CGPA – 0.5) x 10

14.0. Award of Degree

14.1 A Student who registers for all the specified Courses as listed in the Course Structure, satisfies all the Course Requirements, and passes all the examinations prescribed in the entire UG E&T Programme (UG PROGRAMME), and secures the required number of 160 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.

14.2. A Student who qualifies for the Award of the Degree as listed in Item 14.1, shall be placed in the following Classes …

(a) Students with final CGPA (at the end of the UG PROGRAMME) ≥ 8.00, and fulfilling the following conditions -

(i) should have passed all the Courses in 'FIRST APPEARANCE' within the first 4 Academic Years (or 8 Sequential Semesters) from the Date of Commencement of his First Academic Year,

(ii) should have secured a CGPA ≥ 8.00, at the end of each of the 8 Sequential Semesters, starting from the I Year I 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'**.

(b) Students having final CGPA (at the end of UG PROGRAMME) ≥ 8.00 , but not fulfilling the above

conditions shall be placed in 'FIRST CLASS'.

(c)Students with final CGPA (at the end of the UG PROGRAMME) ≥ 6.50 but < 8.00, shall be placed in 'FIRST CLASS'.

(d) Students with final CGPA (at the end of the UG PROGRAMME) ≥ 5.50 but < 6.50, shall be placed in 'SECOND CLASS'.

(e) All other Students who qualify for the Award of the Degree (as per Item 14.1), with final CGPA (at the end of the UG PROGRAMME) ≥ 5.00 but < 5.50, shall be placed in 'PASS CLASS'.

14.3. A student with final CGPA (at the end of the UG PROGRAMME) < 5.00 will not be eligible for the Award of the Degree.

14.4. Students fulfilling the conditions listed under Item 14.2(a) alone will be eligible candidates for - 'College Rank' and 'Gold Medal' considerations.

15.0. Withholding of Results

15.1 If the student has not paid fees to College at any stage, or has pending dues against his name due to any reason whatsoever, or if any case of indiscipline is pending against him, the result of the student may be withheld, and he 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.

16.0 Transitory Regulations

16.1 **For Students detained due to shortage of attendance and credits**

i) The Student who has not registered in a particular semester for any reason, or has been detained for want of attendance may be considered eligible for readmission to the same semester in the next Academic Year or subsequent academic years. The student who has been detained for lack of credits can be readmitted to the next Academic Year only on obtaining minimum required credits.

ii) A Student who has been detained in I year I Semester of R14/R15 Regulations due to lack of attendance shall be permitted to join I year I Semester of R18 Regulations and is required to complete the study of B.Tech. programme within the stipulated period of eight academic years from the date of first admission in I Year.

iii) A student who has been detained in II semester of I Year or any semester of II, III and IV years of R14/R15 regulations for want of attendance shall be permitted to join the corresponding semester of R18 regulations and is required to complete the study of B.Tech within the stipulated period of eight academic years from the date of first admission in I Year. The R18 Academic Regulations under which a student has been readmitted shall be applicable to that student from that semester.

iv) A student of R14/R15 Regulations who has been detained due to lack of credits shall be promoted to the next Academic Year of R18 Regulations only after acquiring the required credits as per the corresponding regulations of his/her first admission. The student is required to complete the study of B.Tech within the stipulated period of eight academic years from the year of first admission.

v) After re-admission the student is required to study the course as prescribed in the new regulations for the re-admitted programme at that level and thereafter.

vi) A student who has failed in any course(s) under any regulation has to pass those course(s) in the same regulations.

vii) In case the course(s) offered in subsequent semesters are repetitive, substitute courses identified by the BOS for replacement of completed courses by the students will be given. The students will be suggested to register the said substitute course(s) in the new regulation. One Internal examination for the substitute course(s) may be conducted before commencement of end semester examinations.

viii) The marks/credits/SGPA are transferred and converted (as per applicable regulations) for all subjects of old regulation if necessary and treated as successfully cleared in the new prescribed program course structure.

ix) For readmitted students the courses studied and cleared in earlier Regulation and not offered those courses in new applicable Regulation are not considered for SGPA & CGPA calculation when secured credits are greater than maximum credits for the award of degree.

x) The decision of BOS is final in case of any ambiguity in identifying the equivalent/substitute courses

xi) The decision of Academic council is final in case of any ambiguity in transitory regulations

16.2. **For Transferred Students**

i) The students seeking transfer to CMRCET from various other Universities/Institutions have to pass the failed course(s) which are equivalent to the course(s) of CMRCET, and also have to pass the course(s) of CMRCET which the students have not studied at the earlier institution. Further the students have passed some of the course(s) at the earlier institutions, and if the same course(s) are prescribed in different semesters of CMRCET and repeated, then substitute courses(with equal credits) identified by BOS may be given to the students

ii) For not cleared course(s) in the previous Institute, equivalent course(s) will be identified by the BOS for pursuing the same. The students will be suggested to pursue the course and to register the said equivalent course(s) in the new regulation and to qualify in examinations.

iii) Marks/Grades/Credits obtained in the courses completed in previous Institution are to be converted in to equivalent Grades/Credits/SGPA/CGPA as per CMRCET regulations.

iv) One Internal examination for the course(s) not studied in previous institution and taken as additional/substitute courses in CMRCET may be conducted before commencement of end semester examinations.

v) If necessary the student may be given additional course(s) in place of the course(s) studied in earlier Institution which are not part of CMRCET regulation to balance and meet the credit requirement for the award of degree as per applicable regulation

vi) The students who seek transfer to CMRCET from various other Universities/Institutions, and satisfy credits requirement as per earlier institution but not satisfy the credit requirements as per CMRCET after finalizing equivalent course(s), may be permitted to continue the programme. However such a student has to meet the requirement of credits for promotion to the next year as per CMRCET applicable regulations.

vii) For transferred students the courses studied and cleared in earlier Institution and not offered those courses in CMRCET are not considered for SGPA & CGPA calculation when secured credits are greater than maximum credits for the award of degree.

viii) In case of any ambiguity in identifying the equivalent/substitute courses, the decision of BOS is final.

ix) The decision of Academic council is final in case of any ambiguity in transitory regulations

17.0 Student Transfers

17.1 There shall be no Branch transfers after the completion of Admission Process.

17.2 Transfer of candidates from other Institutions will be governed by the regulations of Telangana State Government issued from time to time.

18.0 Scope

i) Where the words "he", "him", "his", occur in the write-up of regulations, they include "she", "her", "hers".

ii) Where the words "Subject" or "Subjects", occur in these regulations, they also imply "Course" or "Courses".

iii) The Academic Regulations should be read as a whole, for the purpose of any interpretation.

iv) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor/ Principal is final.

v) The College may change or amend the Academic Regulations, Course Structure or Syllabi at any time, and the changes or

amendments made shall be applicable to all Students with effect from the dates notified by the College Authorities.

Department of Civil Engineering

Institute Vision:

To be a premier academic institution striving continuously for excellence in technical education, research and technological services to the nation.

Institute Mission:

1. Create and sustain a community of learning in which students acquire knowledge and learn to apply it professionally with a concern for the society.
2. Pursue and disseminate research findings and offer knowledge- based technological services to satisfy the needs of society and the industry.
3. Promote professional ethics, leadership qualities and social responsibilities.

Department Vision:
To evolve as a centre of academic excellence and advanced research in Civil engineering and related areas**.**

Department Mission:
To inculcate students with profound understanding of fundamentals related to discipline, attitudes, skills and their application in solving real world problems, with an inclination towards societal issues and research.

Programme Educational Objectives (PEOs)

PEO1: Excel in their professional career and higher education in their relative fields.

PEO2: Exhibit professionalism through leadership, communication skills and team work.

PEO3: Adapt to emerging trends for sustained growth and exhibit social responsibility and professional ethics.

Programme Outcomes (POs)

PO1: Ability to apply knowledge of mathematics, science, and engineering for solving complex engineering problems.

PO2: Ability to design and conduct experiments, as well as to analyze and interpret data to reach substantiated conclusions.

PO3: Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

PO4: Ability to use research-based knowledge and research methods including design of experiments to provide valid conclusions.

PO5: Ability to learn and apply appropriate modern tools for engineering solutions.

PO6: Ability to assess societal, health, safety, legal and cultural issues and the consequent responsibilities and follow them in professional practice.

PO7: Ability to understand the impact of the professional practices on environment, society and its sustainable development.

PO8: Ability to understand professional and ethical

responsibilities. PO9: Ability to function an individual and

in multidisciplinary teams. PO10: Ability to communicate

effectively.

PO11: Ability to understand engineering and management principles and apply them to one's own work, as a member and leader in a team, to manage projects.

PO12: Ability to engage in lifelong learning.

Programme Specific Outcomes (PSOs)

PSO1: Graduates will have an ability to apply knowledge in identification, formulation, understanding the problem related to Civil Engineering

PSO2: Execution at optimum cost, with quality using appropriate tools adopting safety norms with an inclination towards social issues and research.

B.TECH (CIVIL ENGINEERING) COURSE STRUCTURE R-18

	I SEMESTER					
CODE	**SUBJECT**	**CAT**	**L**	**T**	**P**	**C**
A30004	Linear Algebra and Calculus	BSC	3	1	0	4
A30008	Engineering Physics	BSC	3	1	0	4
A30311	Engineering Mechanics	ESC	3	1	0	4
A30312	Engineering Graphics	ESC	1	0	4	3
A30010	Engineering Physics Lab	BSC	0	0	3	1.5
A30505	Basic Internet of Things Lab	ESC	0	0	2	1
A30020	Introduction to Social Innovation	HSMC	0	0	2	1
			10	**3**	**11**	**18.5**
	II SEMESTER					
CODE	**SUBJECT**	**CAT**	**L**	**T**	**P**	**C**
A30001	English	HSMC	2	0	0	2
A30005	ODEs and Multivariable Calculus	BSC	3	1	0	4
A30011	Engineering Chemistry	BSC	3	0	0	3
A30501	Programming for Problem Solving	ESC	3	0	0	3
A30002	English Language Communication Skills Lab	HSMC	0	0	3	1.5
A30012	Engineering Chemistry Lab	BSC	0	0	3	1.5
A30502	C Programming Lab	ESC	0	0	3	1.5
A30314	Engineering Workshop	ESC	0	0	3	1.5
A30019	Engineering Exploration & Practice	BSC	0	0	3	1.5
			11	**1**	**15**	**19.5**
	Total Credits I year: 38					

	III SEMESTER					
CODE	**SUBJECT**	**CAT**	**L**	**T**	**P**	**C**
A30101	Strength of Materials I	PCC	2	1	0	3
A30102	Fluid Mechanics	PCC	2	1	0	3
A30103	Surveying & Geomatics	PCC	3	0	0	3
A30104	Engineering Materials & Geology	PCC	2	0	0	2
A30105	Building Construction, Planning and Drawing	PCC	2	0	2	3
A30226	Basic Electrical and Electronics Engineering	ESC	3	0	0	3
A30106	Surveying Lab I	PCC	0	0	3	1.5
A30107	Strength of Materials Lab	PCC	0	0	3	1.5
A30021	Social Innovation in Practice	HSMC	0	0	2	1
A30014	Environmental Sciences	MC	2	0	0	0
			16	**2**	**10**	**21**
	IV SEMESTER					
CODE	**SUBJECT**	**CAT**	**L**	**T**	**P**	**C**
A30007	Numerical Techniques & Probability Distributions	BSC	3	1	0	4
A30108	Strength of Materials-II	PCC	2	1	0	3
A30109	Hydraulics and Hydraulics Machinery	PCC	3	0	0	3
A30110	Environmental Engineering	PCC	2	0	0	2
A30111	Concrete Technology	PCC	2	0	0	2
A30112	Structural Analysis- I	PCC	2	1	0	3
A30113	Fluid Mechanics and Hydraulics Machinery Lab	PCC	0	0	3	1.5
A30114	Surveying Lab-II	PCC	0	0	3	1.5
A30016	Gender Sensitization	MC	0	0	2	0
			14	**3**	**8**	**20**
	Total Credits II year: 41					

	V SEMESTER					
CODE	**SUBJECT**	**CAT**	**L**	**T**	**P**	**C**
A30013	Business Management & Financial Analysis	HSMC	4	0	0	4
A30115	Design and Drawing of RCC Structures	PCC	2	0	2	3
A30116	Geotechnical Engineering	PCC	2	1	0	3
A30117	Transportation Engineering-I	PCC	3	0	0	3
A30118	Structural Analysis -II	PCC	2	1	0	3
	Professional Elective -1	PEC	3	0	0	3
A30119	Concrete Technology Lab	PCC	0	0	3	1.5
A30120	Highway Material & Engineering Geology lab	PCC	0	0	3	1.5
A30560	Introduction to Artificial Intelligence	MC	3	0	0	0
A30015	Soft Skills & Professional Ethics	MC	2	0	0	0
A30022	NCC/NSS		0	0	2	0
A30121	Mini Project - I	MC	During the Summer Vacation / Non Credit			
A30122	Internship-I					
			21	**2**	**10**	**22**
	VI SEMESTER					
CODE	**SUBJECT**	**CAT**	**L**	**T**	**P**	**C**
A30123	Design and Drawing of Steel Structures	PCC	2	0	2	3
A30124	Foundation Engineering	PCC	3	0	0	3
A30125	Estimation and Costing	PCC	3	0	0	3
A30126	Water Resource Engineering	PCC	3	0	0	3
	Professional Elective II	PEC	3	0	0	3
A30003	Advanced English Communication Skills Lab	HSMC	0	0	3	1.5
A30127	Geotechnical Engineering Lab	PCC	0	0	3	1.5
A30128	Technical Seminar-I	PW	2	0	0	2
A30556	Cyber Security	MC	3	0	0	0
A30017	Indian Constitution	MC	2	0	0	0
A30018	Essence of Indian Traditional Knowledge					
			21	**0**	**8**	**20**
	Total Credits III year: 42					

	VII SEMESTER					
CODE	**SUBJECT**	**CAT**	**L**	**T**	**P**	**C**
	Professional Elective - III	PEC	3	0	0	3
	Professional Elective- IV	PEC	3	0	0	3
	Professional Elective - V	PEC	3	0	0	3
	Open Elective: I	OEC	3	0	0	3
	Open Elective: II	OEC	3	0	0	3
A30129	Computer Aided Designing and Drafting	PCC	0	0	3	1.5
A30130	Environmental Engineering Lab	PCC	0	0	3	1.5
A30131	Major Project Phase -I	PW	0	0	6	3
A30132	Mini Project-II	MC	During the Summer Vacation / Non Credit			
A30133	Internship-II					
			15	**0**	**12**	**21**
	VIII SEMESTER					
CODE	**SUBJECT**	**CAT**	**L**	**T**	**P**	**C**
	Professional Elective-VI	PEC	3	0	0	3
	Open Elective: III	OEC	3	0	0	3
	Open Elective: IV	OEC	3	0	0	3
A30134	Technical Seminar-II	Project	2	0	0	2
A30135	Major Project Phase -II	Project	0	0	14	7
			11	**0**	**14**	**18**
	Total Credits IV year: 39					
	TOTAL CREDITS					**160**

	Professional Elective-I					
Code	**Course Title**	**CAT**	**L**	**T**	**P**	C
A30140	Solid and Hazardous Waste Management	**PEC**	3	0	0	3
A30141	Industrial Waste Water Treatment	**PEC**				
A30142	Environmental Impact Assessment	**PEC**				
	Professional Elective-II					
A30143	Prestressed Concrete	**PEC**	3	0	0	3
A30144	Design of Bridge Structures	**PEC**				
A30145	Elements of Earthquake Engineering	**PEC**				
	Professional Elective-III					
A30146	Irrigation Design and Drawing	**PEC**	3	0	0	3
A30147	Irrigation and Hydraulics Structures	**PEC**				
A30148	Watershed Management	**PEC**				
	Professional Elective-IV					
A30149	Advanced Structural Design	**PEC**	3	0	0	3
A30150	Finite Element Methods in Civil Engineering	**PEC**				
A30151	Construction Technology and Project management	**PEC**				
	Professional Elective-V					
A30152	Urban Transportation Planning	**PEC**	3	0	0	3
A30153	Pavement Material Characterization	**PEC**				
A30154	Transportation Engineering-II	**PEC**				
	Professional Elective-VI					
A30155	Ground Water Development	**PEC**	3	0	0	3
A30156	Geo-Environmental Engineering	**PEC**				
A30157	Ground Improvement Techniques	**PEC**				

OPEN ELECTIVES			
Sl. No	**Subject Code**	**Name of the Subject**	**Offered by Dept.**
1	A30554	Java Programming	CSE
2	A30531	Python Programming	CSE
3	A30555	Introduction to Database Management Systems	CSE
4	A30537	Data Analytics with R	CSE
5	A30557	Web Programming	CSE
6	A30542	Cloud Computing	CSE
7	A30538	Deep Learning	CSE
8	A30559	Introduction to Data Science	CSE
9	A30471	Principles of Electronic Communications	ECE
10	A30472	Basic Electronics Engineering	ECE
11	A30473	Image Processing	ECE
12	A30474	Digital Electronics	ECE
13	A30475	Data Communications	ECE
14	A30476	Microcontrollers & Applications	ECE
15	A30477	Fundamentals of Embedded Systems	ECE
16	A30478	Sensors & Transducers	ECE
17	A30258	Basics of Power Electronics & Drives	EEE
18	A30252	Power Generation Systems	EEE
19	A30259	Electrical & Hybrid Vehicles	EEE
20	A30260	Electrical Safety	EEE
21	A30253	Fuel Cell Technology	EEE
22	A30255	Energy Efficiency in Electrical Utilities	EEE
23	A30256	Energy Audit & Conservation	EEE
24	A30257	Nano Technology	EEE
25	A30383	Fundamentals of Engineering Materials	ME
26	A30377	Basics of Thermodynamics	ME
27	A30357	Fundamentals of Manufacturing Processes	ME
28	A30379	Fundamentals of Automobile Engineering	ME
29	A30382	Fundamentals of Mechanical Engineering	ME

30	A30378	Waste to Energy	ME
31	A30358	Industrial Safety Engineering	ME
32	A30360	Work System Design	ME
33	A30160	Disaster Management and Mitigation	CE
34	A30161	Remote Sensing and GIS	CE
35	A30162	Green Buildings	CE
36	A30163	Air Pollution and Control	CE
37	A30164	Basics of Civil Engineering	CE
38	A30165	Sustainability Concepts in Civil Engineering	CE
39	A30166	Environmental Protection and Management	CE
40	A30167	Alternate Building Materials	CE
41	C30161	Logistics and Supply Chain Management	MBA
42	C30162	Knowledge Management	MBA
43	C30163	Management of Industrial Relations	MBA
44	C30164	Entrepreneurship	MBA
45	C30165	Basics of Insurance & Taxation	MBA
46	C30166	Business Ethics & Corporate Governance	MBA
47	C30167	Marketing Management	MBA
48	C30168	Intellectual Property Rights	MBA

Note: The above courses (Open Electives) are exclusively offered to Students who have not studied the above courses (OEs) or their advanced Courses as part of their Professional Electives or Professional Core Courses.

I SEMESTER

(A30004)LINEAR ALGEBRA AND CALCULUS –I

(Common to all branches)	L	T	P	C
B.Tech (CE) I Semester	**3**	**1**	**0**	**4**

UNIT-I

Matrices and Linear System of Equations: Elementary row transformations- Rank – Echelon form, Normal form- Solution of linear systems, Eigen values, Eigen vectors- Properties, Cayley – Hamilton theorem (qualitative)–Inverse and powers of a matrix by Cayley-Hamilton theorem. Diagonalization of matrix, Linear transformation- Orthogonal transformation.

UNIT-II

Differential Equations of First Order and their Applications: Over view of differential equations – Exact, Linear and Bernoulli's differential equations, Applications to Newton's law of cooling, Law of natural growth and decay, Orthogonal trajectories.

UNIT-III

Higher Order Linear Differential Equations: Linear differential equations of second and higher order with constant coefficients. RHS term of the type ( ) = ,sin ,cos , , , , Method of variation of parameters.

UNIT-IV

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

UNIT-V

Partial Differential Equations: Introduction and formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, Solutions of first order linear (Lagrange) equation and non- linear partial differential equations (Charpit's method), Method of separation of variables.

Text Books

1. Advanced Engineering Mathematics(9^{th} edition) by Erwin Kreyszig John Wiley & Sons Publishers
2. Higher Engineering Mathematics(36^{th} edition) by B.S. Grewal, Khanna Publishers.
3. Advanced Engineering Mathematics(3^{rd}edition) by R.K. Jain & S.R.K. Iyengar, Narosa Publishing House, Delhi.

Reference Books

1. Differential Equations with Applications & Historical Notes (2^{nd} edition) by George F Simmons, Tata Mc.graw Hill Publishing Co. Ltd.
2. Mathematics for Engineering and Scientists(6^{th} edition) by Alan Jeffrey, Chapman & Hall / CRC,2013
3. Engineering Mathematics – I by T.K.V. Iyengar, B. Krishna Gandhi & Others, EditionS.Chand2013 Yr.
4. Engineering Mathematics – I by D.S. Chandrasekhar, Prison Books Pvt. Ltd.
5. Engineering Mathematics – I by G. ShankerRao& Others I.K. International Publications.
6. Applied Mathematics for Engineers & Physicists (3^{rd} edition) by Pipes &Harvill , McGraw Hill Internation Book company.

Course Outcomes

On completion of the course students will be able to

1. Solve linear system by using various methods of matrices, find eigenvalues, eigen vectors and diagonalization of a square matrix.
2. Understand the formation and evaluation of different differential equations by various methods.
3. Solve higher order linear differential equations.
4. Find expansion of a given function by Fourier series
5. Solve various partial differential equations.

(A30008) ENGINEERING PHYSICS

B.Tech(CE): I Semester	L	T	P	C
	3	1	0	4

UNIT-I

Waves & Oscillations: Simple harmonic oscillators,Phasor representation of simple harmonic motion,Damped harmonic oscillator

– heavy, critical and light damping, Energy decay in a damped harmonic oscillator, Quality factor, forced harmonic oscillations and resonance, Mechanical and electrical oscillators-analogy between them, Transverse wave on a string, the wave equation of a string (qualitative), standing waves,longitudinal waves and the wave equation for them (qualitative), acoustic waves and speed of sound(qualitative).

UNIT-II

Interference: Huygens's principle, Superposition of waves and interference of light, Interference due to division of wave front- Young's double slit experiment, Interference due to division of amplitude- interference in thin films (reflected light), Newton's rings- determination of wavelength of light, Michelson's interferometer (qualitative).

Diffraction: Diffraction (definition), Distinctions between Fraunhofer& Fresnel diffraction,Fraunhofer diffraction due to single slit and Double Slit- Conditions for principle maxima - secondary maxima and minima,Fraunhofer diffraction due to a grating - Construction of diffraction grating - Rayleigh criterion of resolving power- Resolving power of a grating.

UNIT-III

Lasers: Characteristics of lasers, Absorption, spontaneous and stimulated emission of radiation, Einstein's coefficients and relation between them, Population inversion, Lasing

action,Ruby laser, Helium- Neon laser, Semiconductor diode laser, Applications of lasers.

Fiber Optics: Principle of Optical fiber, Construction of optical fiber, acceptance angle and acceptance cone, Numerical Aperture, Types of optical fibers: Single and Multimode fibers, Step Index optical fibers& Pulse dispersion (qualitative treatment) - Graded index optical fibers& Pulse dispersion(qualitative treatment), Attenuation in optical fibers, optical fiber communication, optical fiber sensors.

UNIT-IV

Dielectric Properties: Electric dipole, Dipole moment, Relative permittivity, Polarization and polarizability, Electric susceptibility, Displacement vector, Electronic andIonic polarization,Orientation polarization (qualitative treatment),Internal fields in solids, Clausius– Mossotti equation, Piezo electric and Pyro-electric materials,Ferro electric materials.

Magnetic Properties: Permeability, Field intensity, Magnetic field induction, Magnetization, Magnetic Permeability & Susceptibility, Classification of Dia, Para,Ferro, Ferri and Anti-Ferro magnetic materials on the basis of magnetic moment (qualitative treatment), Explanation of Hysteresis curve on the basis of Domain theory of ferro magnetism.

UNIT-V

Engineered materials : Origin of nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Practical examples of low dimensional system such as Quantum wells, wires, dots, Fabrication – Top down and Bottom –up approach (qualitatively) Characterization by XRD & TEM, Applications.

Text Books

1. Engineering Physics by B.K. Pandey,S. Chaturvedi,Cengage Learning India Pvt. Ltd.,1st Edition, 2012.

2. Engineering Physics by PK Palanisamy,SciTech Publications, 3rd edition, 2015.
3. Vibrations and waves in physics by Ian G. Main,Cambridge University press, 3rd edition,1994.

References

1. The Physics of vibrations and wave by H.JohnPain,Wiley, 6th edition, 2005.
2. Fundamentals of Physics by Halliday,R.Resnick and J.Walker,John Wiley and Sons,6th edition, 2001.
3. Mechanics of Particles, Waves & Oscillations by Anwar Kamal, New Age International Ltd, 3rd edition, 2004.

Course Outcomes

On completion of the course students will be able to

1. Compare different types of waves and harmonic oscillations.
2. Describe different phenomenon of optics.
3. Explain the basic concepts of lasers and optical fiber characteristics.
4. Classify various polarization processes in solids & different dielectric materials.Describe different types of magnetic materials.
5. Describe basic principles of low dimensional Engineering materials.

(A30311)ENGINEERING MECHANICS

B.Tech (CE) I Semester	L	T	P	C
	3	1	0	4

UNIT I

Introduction to Engineering Mechanics

Force Systems, Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body Equilibrium; System of Forces, Coplanar Concurrent Forces, Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems.

UNIT II

Friction: Introduction, Types of Friction, Laws of Friction, Static and Dynamic Friction.

Centroid and Centre of Gravity: Centroid of lines, areas and volumes from first principle, Centroid of composite sections; Centre of Gravity and its implications; Theorem of Pappus

UNIT III

Moment of Inertia: Area moment of inertia- Definition, Parallel Axis theorem, Perpendicular Axis theorem, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections;

Mass moment inertia: Moment of inertia of masses-Transfer formula for Mass Moment of Inertia, Mass Moment of circular plate, Cylinder, Cone, Sphere, Hook.

UNIT IV

Review of particle dynamics

Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct

and oblique).

UNIT V

Introduction to Kinetics of Rigid Bodies

Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and
connected bodies; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation.

Text Books

1. Timoshenko, Stephen P., and Donovan Harold Young. "Engineering mechanics." (1956).
2. Singer, Ferdinand Leon. Engineering mechanics. HarperCollins Publishers, 1975.

Reference Books

1. Shames, Irving Herman, and G. Krishna Mohana Rao. Engineering mechanics: statics and dynamics. Englewood Cliffs: Prentice-Hall, 1967.
2. Meriam, James L., and L. Glenn Kraige. Engineering mechanics: dynamics. Vol. 2. John Wiley & Sons, 2012.
3. McLean, William George, and Eric William Nelson. "Schaum's outline of theory and problems of engineering mechanics, statics and dynamics." (1978).

Course outcomes

Upon successful completion of the course, student should be able to:

1. Apply fundamental concepts of kinematics and kinetics of particles to analyze Simple practical problems.
2. Apply basic knowledge of maths and physics to solve real-world problems.
3. Explain measurement error, and propagation of error in processed data.

4. Use basic kinematics concepts – displacement, velocity and acceleration and their angular counterparts to solve related problems.
5. Use basic dynamics concepts – force, momentum, work and energy to solve related problems.
6. Apply Newton's laws of motion for engineering problems.

(A30312)ENGINEERING GRAPHICS

B.Tech (CE) I Semester	L	T	P	C
	1	0	4	3

UNIT-I

Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, Usage Of Drawing Instruments, Lettering, Conic sections (General method only); Cycloid, Epi cycloid, Hypocycloid; Scales – Plain, Diagonal, Vernier.

UNIT-II

Orthographic Projections Principles of Orthographic Projections-Conventions - Projections of Points and lines, Projections of plane regular geometric figures.

UNIT-III

Projections of Regular Solids Projections of solids inclined to both the Planes. Sections and Sectional Views of Right Angular Solids: Prism, Cylinder, Pyramid, Cone.

UNIT-IV

Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone. Intersection of solids- Cylinder Vs Cylinder, Cylinder Vs Prism.

UNIT-V

Isometric Projections Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

Text Books

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication

Reference Books

1. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education

Course Outcomes

On completion of the course students will be able to:

1. Apply the use of engineering curves in tracing the part of different machine components.
2. Evaluate the concepts of projections and acquire knowledge of visualization skills and convert it into pictorial representation.
3. Create and analyze the 3-D objects of machine components in real world.
4. Explore and evaluate the internal architecture of product by section and development of surfaces.
5. Create and imagine the solid and real objects in real world with axonometric projection.

(A30010)ENGINEERING PHYSICS LAB

B.Tech (CE): I Semester	L	T	P	C
	0	0	3	1.5

(Any ten experiments compulsory)

1. Melde's experiment – Transverse and longitudinal modes.
2. Determination of Rigidity modulus of a material - Torsional pendulum
3. L-C-R circuit.
4. Determination of velocity of ultrasonic waves.
5. Frequency of AC Supply- Sonometer
6. Magnetic field along the axis of current carrying coil – Stewart and Gees method.
7. Energy gap of a material of p-n junction.
8. Wavelength of light –Diffraction grating using laser.
9. Determination of beam divergence of a given laser.
10. Bending losses of fibres & Evaluation of numerical aperture of a given fibre.
11. Characteristics of a LED.
12. Characteristics of a photodiode.
13. Characteristics of a solar cell.
14. Determination of Planck's constant using LED.
15. Determination of wavelength of a source – Diffraction Grating.
16. Newton's Rings - Radius of curvature of plano convex lens.
17. Time constant of an R-C circuit.

Laboratory Manual

1. Laboratory Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.VenkateswaraRao (V.G.S Publishers).

Reference Book

1. "Fundamentals of Physics", 6th Ed., D. Halliday, R. Resnick and J. Walker, John Wiley and Sons,Inc., New York, 2001

Course Outcomes

On completion of the course students will be able to

1. Explain the concept of oscillations and resonance.
2. Determine energy gap of a semiconductor diode, Planck's constant and magnetic fields.
3. Describe the characteristics of semiconductor devices
4. Design new experiments in engineering.
5. Evaluate the basic properties of lasers and optical fibers.

(A30505)BASIC INTERNET OF THINGS LAB

B.Tech (CE): I Semester

Lab Requirements:
Raspberry Pi3 single board Computer, Android SDK,Eclipse IDE, JDK1.8.

Week 1: Introduction to IoT

- Definition of IoT
- History of IoT
- IoT Architecture
- Enabling Technologies for IoT
- Fundamental characteristics of IoT
- Benefits and Applications ofIoT
- Introduction to Basic Components

Basic Components

- Breadboard
- Relays
- RC Servo
- Push Button
- DC Motor
- Temperature Sensor
- Buzzer
- Photo resistor Diode
- Potentiometer Resistors
- LEDs (Light Emitting Diodes)
- Jumper wires

Week 2: Programming in python

- Introduction to Python
- Python Installation
- Understanding Python Basics
- Using Arithmetic in your programs
- Learning about Loops

Week 3: Platform Based Development – Raspberry Pi
Introduction to Raspberry Pi

- Why Raspberry Pi?
- Setting up the Raspberry Pi
- Python on Raspberry Pi

Week 4: Basic Experiments Level-1

Demonstration of the following Experiments

Experiment 1: Your First Circuit – To Blink an LED (Light Emitting Diode)

Experiment 2: To Blink an RGB LED

Additional Experiments (optional)

Experiment 1: To read the temperature and display the same in serial monitor. (use LM35 Temperature sensor)

Experiment 2: To make an LED glow when controller detects a button pressed.

Week 5: Basic Experiments Level -2

Demonstration of the following Experiment

Experiment 1: To control an LED according to the range of analog input sensed using photo resistor. (use Light Dependent Resistor(LDR)

Additional Experiments (optional)

Experiment 1: To interface the Liquid Crystal Display (LCD) with the Arduino Uno to display the characters on the LCD.

Week 6: Basic Experiments Level -3

Demonstration of the following Experiment

Experiment1: To interface the Ultrasonic Sensor with the Arduino Uno to determine the distance of an object from the sensor.

Additional Experiments (optional)

Experiment1: To interface the Infrared sensor with the Arduino Uno to sense the path is clear/indicate the presence of any obstacles.

Week 7: Introduction to Android

- Explain the structure of Android App.
- Create Hello World application with Android.

Week 8

- Create Application to change the Background Color and Background Image
- Explain simple User interface components in Android and create simple Application

Week 9

- Create an application that display color or image as background when selected the radio buttons or checkboxes.
- Create an Application to perform addition, Subtraction, multiplication, division.

Week 10

- Explain what activity, intent and its functions is.
- Create an application with Android intent.

Week 11

Create a simple android application with the following event handlers.

- On Click
- On Key Down
- On Focus changed

Week 12

- Explain about Toast, Create Application with User defined Toast Notifications.
- Create login page by using login activity.

Reference books

1. ArshdeepBahga,VijayMadisetti, Internet of Things: A Hands-On Approach, Orient Blackswan Private Limited - New Delhi; First edition (2015).
2. John Horton, Android Programming for Beginners, PACKT publications.

Course Outcomes

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

1. Identify and differentiate various components used in IoT Architecture.
2. Write & execute programs in python programming language.
3. Use python programming language to interface with raspberry.
4. Demonstrate the various real time applications using Raspberry Pi.
5. Create and deploy mobile applications using android.

(A30020) INTRODUCTION TO SOCIAL INNOVATION

B. Tech. (CE) I-Semester

L	T	P	C
0	0	2	1

UNIT I

Community Study: Types and features of communities- Rural, Suburban, Urban and regional, Service based learning, Aims of community based projects, Community visits.

UNIT II

Social Innovation across Four Sectors: The four sectors – the non- profit sector, public sector, the private sector, the informal sector, links between and cross sectors.

UNIT III

Stages of Social Innovation: Social organizations and enterprises, social movements, politics and government, markets, academia, philanthropy, social software and open source methods, common patterns of success and failure.

UNIT IV

Engineering Ethics: Introduction to ethics, moral values, significance of professional ethics, code of conduct for engineers, identify ethical dilemmas in different tasks of engineering, applying moral theories and codes of conduct for resolution of ethical dilemmas.

UNIT V

Steps for Patent filing and Startups, poster presentation.

References

1. Social Entrepreneurship for the 21st Century: Innovation Across the Non Profit, Private and Public Sectors; Georgia LevensonKeohane; Tata McGraw Hill
2. Social Enterprises: An Organizational Perspective

edited; Benjamin Gidron, YeheskelHasenfeld; Palgrave Macmillan
3. Engineering Ethics: An Industrial Perspective ; Gail Baura; Elsevier
4. Intellectual Property and Financing Strategies for Technology Startups; Gerald B. Halt, Jr., John C. Donch, Jr., Amber R. Stiles, Robert Fesnak; Springer
5. Fundamentals of Intellectual Property (English) 1st Edition (Paperback, Dr. Kalyan C. Kankanala) Publisher: Asia Law House ISBN: 9789381849514, 938184951X Edition: 1st Edition, 2012.
6. Indian Patent Law (English, Paperback, Kalyan C. Kankanala) Publisher: Oxford University Press- New Delhi, ISBN: 9780198089605, 0198089600 Edition: 2012.

Course Outcomes

On Completion of the course, the students will be able to

1. Illustrate the factors affecting social innovation
2. Illustrate the impact of social innovation in various sectors
3. Adopt the ethical values in doing innovation, which leads to betterment of society.

SEMESTER II

(A30001) ENGLISH

B.Tech (CE): II Semester

L	T	P	C
2	0	0	2

UNIT-I

Chapter entitled '**Presidential Address' Dr. A.P.J. Abdul Kalam** from "**Fluency in English**" Published by Orient Black Swan, Hyderabad.

Vocabulary: Word Formation: Prefixes, Suffixes and Compounds Collocations. Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, synonyms, antonyms, and standard abbreviations.

UNIT-II

Basic Writing Skills: Sentence Structures, Use of phrases and clauses in sentences, Importance of proper punctuation, Creating coherence, Organizing principles of paragraphs in documents, Techniques for writing precisely.

UNIT-III

Chapter entitled **'Technology with a Human Face' – E.F. Schumacher** from "**Fluency in English**" Published by Orient Black Swan, Hyderabad.

Vocabulary: Commonly Confused Words, commonly Misspelled Words.

Grammar: Tenses: Types and Uses.

Reading: Summaries and Abstracts.

Writing: Letter Writing: Writing covering letters for job applications, writing a CV/Resume.

UNIT-IV

Chapter entitled '**Good Manners'** by J.C.Hill from "**Fluency in English**" Published by Orient Black Swan, Hyderabad.

Vocabulary: Idioms – One-word Substitutes

Grammar: Sequence of Tenses Describing, Defining, classifying.

UNIT –V

Chapter entitled '**Double Angels** by David Scott from "**Fluency in English**" Published by Orient Black Swan, Hyderabad.

Essay writing, Comprehension, Précis Writing.

Text Books

1. A Text book entitled **"Fluency in English**" Published by Orient Black Swan, Hyderabad.

Reference Books

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Course Outcomes

On completion of the course students will be able to

1. Apply the Noun-Pronoun Agreement, Subject-Verb Agreement in sentence formation.
2. Identify the Root Words from other Languages.
3. Describe the word formation in English language.
4. Employ Synonyms, Antonyms, Affixation and Acronyms in writing and speaking correct English.
5. Compose essays and summaries in English.
6. Apply the time management skills to make best use of time effectively.
7. Apply the public speaking skills in giving presentations and speeches in English.

(A30005) ODEs AND MULTIVARIABLE CALCULUS
(Common to all branches)

B.Tech (CE) II Semester	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

UNIT-I

Functions of Single & Several Variables: Rolle's theorem,Lagrange's mean value theorem, Cauchy's mean value theorem, Generalized mean value theorem (qualitative), Functions of several variables - Functional dependence,Jacobian,Maxima and minima offunctions of two variables with constraints

UNIT-II

Laplace Transform and its Applications to Ordinary Differential Equations: Laplace transform of standard functions, Inverse transform- First shifting theorem, Transforms of derivatives and integrals, Unit step function Second shifting theorem, Dirac's delta function, Convolution theorem, Periodic function, Differentiation and integration of transforms. Application of Laplace transforms to solve ordinary differential equations.

UNIT-III

Evaluation of improper integrals: Gamma and Beta Functions andtheir properties (qualitative).

Multiple Integrals: Double integrals, Change of variables, Change of order of integration and triple integrals.

UNIT-IV

Vector Differential Calculus: Scalar &vector point functions, Vector differential operator,Gradient, Divergence, Curl, Directional derivatives.

UNIT-V

Vector Integral Calculus & Vector Integral Theorems: Line integral, Work done, Surface integrals, Volume integrals, Gauss's divergence theorem, Green's theorem, Stoke'stheorem (qualitative**)**

Text Books

1. Advanced Engineering Mathematics (9^{th} edition) by Erwin Kreyszig John Wiley & Sons Publishers
2. Higher Engineering Mathematics(36^{th} edition) by B.S. Grewal, Khanna Publishers.
3. Advanced Engineering Mathematics(3^{rd}edition) by R.K. Jain & S.R.K. Iyengar, Narosa Publishing House, Delhi.

Reference books

1. Differential Equations with Applications & Historical Notes (2^{nd} edition) by George F Simmons, Tata Mc.graw Hill Publishing Co. Ltd.
2. Mathematics for Engineering and Scientists. Alan Jeffrey, 6^{th} Edi, 2013, Chapman & Hall / CRC
3. Engineering Mathematics – I by T.K.V. Iyengar, B. Krishna Gandhi & Others, 2012 Yr. Edition S.Chand.
4. Engineering Mathematics – I by D.S. Chandrasekhar, Prison Books Pvt. Ltd.
5. Engineering Mathematics – I by G. ShankerRao& Others I.K. International Publications.
6. Applied Mathematics for Engineers & Physicists (3^{rd} edition) by Pipes &Harvill , McGraw Hill Internation Book company.

Course Outcomes

On completion of the course students will be able to

1. Verify mean value theorems, find maximum and minimum of functions of several variables.
2. Apply Laplace transformations for solutions of ordinary differential equations.
3. Evaluate improper & multiple integrals.
4. Evaluate Gradient, Divergence, Curl, Directional derivatives.
5. Evaluate multiple integrals for vectors, convert line integrals to surface integrals and surface integrals to volume integrals.

(A30011)ENGINEERING CHEMISTRY

B.Tech (CE): II Semester

L	T	P	C
3	0	0	3

UNIT-I

Molecular Structure and Theories of Bonding:

Introduction, Concept of atomic and molecular orbitals, Linear combination of atomic orbitals (LCAO), Molecular orbitals of diatomic molecules, Molecular orbital energy level diagrams of diatomic molecules- N_2, O_2 and F_2, molecular orbitals of butadiene and benzene.

Crystal Field Theory (CFT):

Salient features of CFT, Crystal field splitting patterns of transition metal ion d-orbitals- tetrahedral, octahedral and square planar complexes.

UNIT-II

Electrochemistry:

Introduction**,** Conductance- Specific conductance, Equivalentconductance, Molar conductance and their inter relationship, Numerical problems, Electrochemical cell, Electrode potential, Standard electrode potential and E.M.Fof the cell, Nerns't equation- derivation and applications, Types of electrodes- Quinhydrone electrode, Calomel electrode and Glass electrode. Electro chemical series and its applications. Concept of concentration cells, Electrolytic concentration cell and numerical problems, Batteries- primary (Lithium cell), secondary (Lead acid storage battery and Lithium ion battery) and Fuel cells(H_2-$O_2$and methanol-oxygen).

Corrosion:

Causes and effects of corrosion, Theories of chemical and electrochemical corrosion, Mechanism of electrochemical corrosion, Pilling-Bedworth rule, Types of corrosion- Galvanic, Waterline and Pitting corrosion, Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection, Sacrificial anode and Impressed current cathodic methods, Surface coatings- Metallic coatings, hot dipping, galvanizing and

tinning,Electroplating- Copper plating andelectrolessplating - Nickel plating.

UNIT –III

Spectroscopic Techniques and Applications:

Principles of spectroscopy and selection rules, Applications of UV- Visible spectroscopy, Vibrational and rotational spectroscopy (IRspectroscopy)-Applications, Nuclear magnetic resonance-Chemical shift, Splitting pattern and Integration, Introduction to magnetic resonance imaging.

UNIT-IV

Water Technology:

Sources of water, Impurities in water, Hardness of water, Temporary and permanent hardness, Units of hardness, Estimation of temporary and permanent hardness of water, EDTA method, Numerical problems, Potable water treatment-Specifications, Steps involved in treatment-Sedimentation, Coagulation, Filtration, Sterilization, Desalination of Brackish Water, Reverse Osmosis and Electro dialysis. Industrial water treatment, Boiler troubles-Scales andsludges, Caustic embrittlement, Boiler corrosion, Priming and foaming.Hot lime and cold lime soda process-Numerical problems, Zeolite process and Ion exchange process. Internal conditioning methods like Phosphate, Carbonate, Calgon and Colloidal conditioning.

UNIT-V

Stereochemistry:

Representations of three dimensional structures, Structural isomers and stereoisomers, Configurations and symmetry, Chirality- Enantiomers, Diastereomers, Optical activity, Absolute configurations and conformational analysis of n-butane.

Organic Reaction Mechanisms and Synthesis of a Drug Molecule: Introduction,Substitution reactions- Nucleophilicsubstitution reactions(Mechanisms of SN^1 and SN^2 reactions, Addition reactions- Electrophilic and

nucleophilic addition reactions, Addition of HBr to propene, Mar kownikoff and anti markownikoff's additions,Grignard additions on carbonyl compounds, Elimination reactions- Dehydrohalogenation of Alkyl halides,Shetzeff rule.

Oxidation reactions- Oxidation of Alcohols using $KMnO_4$ and chromic acid, Reduction reactions-reduction of carbonyl compounds using $LiAlH_4$, $NaBH_4$, Synthesis of a commonly used drug molecules (Paracetamol and Ibuprofen).

Text Books

1. "Engineering Chemistry", P.C Jain and Jain Monika,DhanpatRai Publication Company, 16th Edition, 2015.
2. Text Book of Engineering Chemistry by A.Jaya Shree, Wiley India Pvt. Ltd, New Delhi.

Reference Books

1. University chemistry, by B. H. Mahan, Narosa Publication.1998.
2. Chemistry: Principles and Applications, by M. J. Sienko and R.A. Plane, McGraw-Hill, 3rd edition, 1980.
3. Fundamentals of Molecular Spectroscopy, by C. N. Banwell, McGraw-Hill, 3rdrevised edition, 1983.
4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S.Krishnan.
5. Physical Chemistry, by P. W. Atkins, W.H. Freeman and Company, 5th Edition, 1994.
6. "Text Book of Engineering Chemistry", B.Rama Devi, Ch. VenkataRamana Reddy and PrasanthRath,Cengage Learning 2017.
7. "Organic Chemistry", Morison and Boyd, Pearson publications, 7th Edition 2011.
8. Organic Chemistry: Structure and Function by K.P.C.Volhardt and N.E.Schore,5thEdition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

Course Outcomes

After completion of the course students will be able to

1. Explain the benefits of treated water as source in steam generation in industrial applications.
2. Describe how electrochemical concepts can be used in various practical applications.
3. Apply knowledge of corrosion science to problems in materials engineering.
4. Explain various methods of prevention of corrosion of metals.
5. Explain the chemical applications of electricity.
6. Analyze microscopic chemistry in terms of atomic and molecular orbitals.
7. List major chemical reactions that are used in the synthesis of drugs.

(A30501) PROGRAMMING FOR PROBLEM SOLVING

B.Tech (CE) II Semester	L	T	P	C
	3	0	0	3

UNIT -I

Introductory Concepts: Introduction to Computers, Computer Characteristics, Modes of Operation, Types of Programming Languages.

Idea of Algorithm: Steps to solve logical and numerical problems. **Representation of Algorithm**: Flowchart/ Pseudo code with examples.

Algorithms to programs: Source code, variables (with data types), variables and memory locations, Syntax and Logical Errors in compilation, object and executable code

Introduction to C: Some Simple C Programs, Desirable Program Characteristics.

C Fundamentals: The C Character Set, Identifiers and Keywords, Data Types, Constants Variables and Arrays Declarations, Expressions, Statements, Symbolic Constants.

Preparing and Running a Complete C Program: Planning a C Program, Writing a C Program, Entering the Program into the Computer, Compiling and Executing the Program, Error Diagnostics, Debugging Techniques.

Operators and Expressions: Unary Operators, Arithmetic Operators, Relational and Logical Operators, Bitwise Operators, Conditional Operator, Assignment Operators, Special Operators, Precedence & Associativity of Operators, Evaluation of Expressions.

Data Input and Output: Preliminaries, Single Character Input- The getchar Function, Single Character Output- The putchar Function, Entering Input Data- The scanf Function, More About the scanf Function, Writing Output Data- The printf Function, More About the printf Function, The gets and puts Functions

UNIT -II

Control Statements: Preliminaries, Branching: The if-else

Statements, Looping: The while Statement, the do while Statement, the for Statement, Nested Control Structures, the switch Statement, the break Statement, the continue Statement, the goto Statement.
Arrays: Defining an Array, Processing an Array, Multidimensional Arrays.

UNIT -III
Functions: A Brief Overview, Defining a Function, Accessing a Function, Function Prototypes, Passing Arguments to a Function, Recursion, Passing Arrays to Functions.
Program Structure: Storage Classes- Automatic Variables, External Variables, Static Variables and Register Variables, Multi files Programs, More about Library Functions.
Strings: String Handling Functions, Sample C Programs without using library functions.

UNIT -IV
Pointers: Fundamentals Pointer Declarations, Passing Pointers to Functions, Pointers and One-Dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers, Passing Functions to other Functions, More about Pointer Declarations.
Structures and Unions: Defining a Structure, Processing a Structure, User Defined Data Types- typedef & Enumerations, Structures and Pointers, Passing Structures to Functions, Bit fields, Self-Referential Structures and Unions.

UNIT -V
Data Files: Opening and Closing a Data File, Creating a Data File, Processing a Data File, Unformatted Data Files and Command Line Parameters.
Searching and Sorting: Linear and Binary Search, Bubble Sort, Selection Sort and Insertion Sort.

Text Books
1. Byron Gottfried, Schaum's Outline series, "Programming with C", McGraw-Hill.
2. B.A. Forouzan and R.F. Gilberg C Programming

and Data Structures, Cengage Learning, (3rd Edition)

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
2. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression).
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

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Course Outcomes

On completion of the course, the student shall be able to

1. Write algorithms and to draw flowcharts for solving problems.
2. Convert the algorithms/flowcharts to C programs.
3. Code and test a given logic in C programming language.
4. Decompose a problem into functions and to develop modular reusable code.
5. Write C programs using arrays, pointers, strings and structures.
6. Perform searching and sorting.

(A30002) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

B.Tech (CE): II Semester

L	T	P	C
0	0	3	1.5

Shall have **two** parts

A. **Computer Assisted Language Learning (CALL) Lab**
B. **Interactive Communication Skills(ICS) Lab**

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

Exercise – I
CALL Lab: Introduction to Phonetics – Speech Sounds – Vowels and Consonants
ICS Lab: Ice-Breaking activity and JAM session

Exercise – II
CALL Lab: Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.
ICS Lab: Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing Others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette.

Exercise – III
CALL Lab: Minimal Pairs- Word accent and Stress Shifts.
ICS Lab: Descriptions – Place, Person, Object

Exercise – IV
CALL Lab: Intonation and Common errors in Pronunciation.
ICS Lab: Extempore- Public Speaking

Exercise – V
CALL Lab: Neutralization of Mother Tongue Influence and

Conversation Practice

ICS Lab: Giving Directions

Course Outcomes

At the end of the lab session, the students will be able to

1. Illustrates How to Work in Teams
2. Demonstrates Soft Skills and Communications Skills well and Exhibits Decorum with ease
3. Minimizes the usage of Mother Tongue and Apprises Neutral Accent
4. Prepares for employability skills
5. Speaks English Confidently and does Presentations with self- confidence
6. Distinguishes between Sympathy and Empathy
7. Demonstrates the art of persuasion.

(A30012) ENGINEERING CHEMISTRY LAB

B.Tech (CE): II Semester

L	T	P	C
0	0	3	1.5

1. Estimation of Hardness of water by EDTA method.
2. Estimation of Alkalinity of water.
3. Estimation of Copper by Colorimetric Method.
4. Conductometric Titration of a strong acid vs a strong base.
5. Conductometric Titration of a weak acid vs a weak base.
6. Potentiometric Titration of a strong acid vs a strong base.
7. Potentiometric Titration of weak acid vs a weak base.
8. Preparation of Paracetmol and Asprin.
9. Determination of Viscosity of a Liquid.
10. Determination of Surface Tension of a liquid.
11. Adsorption of acetic acid on Activated charcoal.
12. Estimation of iodine in table salt.
13. Thin Layer Chromatography (Ortho-Nitro phenol &Para-Nitro phenol).
14. Determination of rate constant of acid catalyzed hydrolysis of methyl acetate.

Note: A minimum of any 12 experiments listed above to be conduced.

Course outcomes

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

1. Predict the extent of hardness range present in water sample and its consequences in industrial operations
2. Prepare drugs like Aspirin and Paracetmol
3. Estimate the strength of solutions,p^H of various solutions
4. Evaluate the viscosity and surface tension of liquids

5. Employ the conductometric and potentiometric titrations
6. Describe the principlesof adsorption phenomenon.

References

1. Engineering Chemistry Lab Manual, Glaze Publishers 2018.
2. Engineering chemistry by B. Rama Devi & Ch. VenkataRamana Reddy; Cengage Learning, 2012.
3. A Textbook of Engineering Chemistry, SashiChawla, DhanapathRai& Sons.

(A30502) C PROGRAMMING LAB

B.Tech (CE): II Semester

L	T	P	C
0	0	3	1.5

[Note: The programs may be executed using any available Open Source/ Freely available IDE

Some of the Tools available are:
CodeLite: https://codelite.org/
Code::Blocks:
http://www.codeblocks.org/
DevCpp :
http://www.bloodshed.net/devcpp.html
Eclipse: http://www.eclipse.org
This list is not exhaustive and is NOT in any order of preference

Lab 1: Familiarization with programming environment

Lab 2: Simple computational problems using arithmetic expressions
1. Write a C program to find the roots of a quadratic equation.
2. Write a C program to convert centigrade to Fahrenheit.

Lab 3:
3. Write a C program to find maximum of given three numbers.
4. Write a C program to find the factorial of a positive integer.

Lab 4:
5. Write a C program to determine if the given number is a prime number or not.
6. 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 print the Fibonacci sequence up to nth term.

Lab 5:

7. 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.
8. Write a C program to convert a positive integer to a roman numeral. Ex. 11 is converted to XI.

Lab 6:

9. Write a C program to print the Pascal triangles pyramid
10. Write a C program to calculate the following series i) Sin(x) ii) Cos(x) iii) log(x)

Lab 7 :

11. 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 iii) Transpose of a Matrix

Lab 8:

12. Write a C program to read N students data (Rollno, Name, Marks1, Marks2, Marks3) and find the topper (Use array of structures and implement using functions).

Lab 9:

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

Lab 10:

15. Write a C program to display the contents of a file to standard output device.
16. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents

Lab 11:

17. Write a C program that uses non-recursive functions to count the number of palindromes in a given string.
18. Write a C program to replace a substring with another in a given line of text.

Lab 12:

19. Write C programs for implementing the following methods i) Bubble sort ii) Binary Search

Additional Programs:

20. Write a C program that implements the Insertion sort method to sort a given list of integers in ascending order.
21. Write a C Program to implement selection sort.
22. 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.
23. Write a C program to compare two files, printing the first line where they differ.
24. 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
25. Write a C program to merge two files into a third file (i.e., the contents of the first file Followed by those of the second are put in the third file)

Reference books

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

Course outcomes

On completion of the course, the student shall be able to

1. Write & Execute programs using C language Syntax.
2. Correct syntax errors for a given program as reported by the C- Compiler.
3. Develop the real world applications using Arrays, Structures in C and test the applications by execution.
4. Demonstrate the usage of various types of pointers in programs by execution in C.
5. Create read and write to and from simple text and binary files and verify through execution.

(A30314) ENGINEERING WORKSHOP

B.Tech (CE): II Semester

L	T	P	C
0	0	3	1.5

(Two experiments each from any six trades of the following)

1. Carpentry
2. Fitting
3. Tin-smithy
4. House-wiring
5. Foundry
6. Plumbing
7. Welding
8. Black smithy

II Trades for Demonstration and Exposure:

1. Power tools
2. Machine Tools- Operations on Lathe.,

Text Book

1. P Kannaiah and K L Narayana, Workshop Manual, Scitech publishers, Second Edition

Course Outcomes

On completion of the course, students will be able to

1. Create the different patterns with desired shape and size by using wood.
2. Align and assemble different components to create a product by fitting operations.
3. Fabricate the given material to desired product in a particular pattern by tin smithy.
4. Explain the basic principles of electrical systems in day-to-day applications.
5. Mould the component to desire pattern and shape by black smithy.
6. Create the object by casting process using molten metal.
7. Assemble the components with permanent joint by welding process.
8. Describe the process, transfer of fluid or gases from one place to another place by connecting set of pipes with different requirements in plumbing process

(A30019)ENGINEERING EXPLORATION & PRACTICE
(Common to all Branches)

B.Tech (CE): II Semester

L	T	P	C
0	0	3	1.5

Module-I

Introduction to Engineering and Engineering Study: Introduction to Engineering and Engineering Study: Difference between science and engineering, scientist and engineer needs and wants, various disciplines of engineering, some misconceptions of engineering, Expectation for the 21st century engineer.

Module-II

Engineering Design: Engineering Design Process, Multidisciplinary facet of design, Importance of analysis in engineering design, general analysis procedure, Pair wise comparison chart, Introduction to mechatronics system, generation of multiple solution, decision matrix, Concepts of reverse engineering

Module-III

Mechanisms: Basic Components of a Mechanism, Degrees of Freedom or Mobility of a Mechanism, 4 Bar Chain, Crank Rocker Mechanism, Slider Crank Mechanism.

Module-IV

Platform based development: Introduction to various platform based development, programming and its essentials, Introduction to transducers and actuators and its interfacing. Concepts of reverse engineering

Data Acquisition and Analysis: Types of Data, Descriptive Statistics techniques as applicable to different types of data, Types of graphs as applicable to different types of data, Usage of data acquisition tools for descriptive statistics, Data Acquisition, Exporting acquired data to analysis using visual

representation

Module-V

Project Management: Introduction, Significance of teamwork, And Importance of communication in engineering profession, Project management tools: Checklist, Timeline, Gantt chart, And Significance of documentation

Sustainability: Introduction to sustainability, Sustainability leadership, Life cycle assessment, carbon footprint

Reference Books

1. Engineering Fundamentals: An Introduction to Engineering (MindTap Course List) 5th Edition by Saeed Moaveni
2. Software Project Management (SIE), (Fifth Edition); Bob Hughes,Mike Cotterell,Rajib Mall; Published by Tata McGraw- Hill Education Pvt. Ltd (2011) ; ISBN 10: 0071072748 ISBN 13: 9780071072748
3. A Ghosh and AK Malik: Theory of Mechanism and Machine; East West Press (Pvt) Ltd., New Delhi.
4. Arduino Cookbook, 2nd Edition by Michael Margolis: O'Reilly Media
5. Data Acquisition and Analysis - Building an Excel Budget Forecast Workbook by Andrew Greaney (Kindle Edition) ISBN: 1521903468
6. Concepts in Engineering Design – 2016; by Sumesh Krishnan (Author), Dr.Mukul Shukla (Author), Publisher : Notion Press

Course Outcomes

On Completion of the course, the students will be able to

1. Explain the role of an Engineer as a problem solver.
2. Identify multi-disciplinary approach required in solving an engineering problem
3. Analyze a given problem using process of engineering problem analysis.
4. Build simple systems using engineering design process.

5. Analyse engineering solutions from sustainability perspectives.
6. Use basics of engineering project management skills in doing projects.
7. Demonstrate data acquisition and analysis skills using a tool.

SEMESTER III

(A30101) STRENGTH OF MATERIALS – I

B.Tech (CE) III Semester

L	T	P	C
2	1	0	3

UNIT-I

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

Strain Energy - Resilience Gradual, sudden, impact and shock loadings simple applications.

UNIT-II

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

UNIT-III

Flexural Stresses & Shear Stresses

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 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- Principle stresses and strains- analytical and graphical solutions-Various theories of failures: Introduction, Various Theories of failures like Maximum Principal Stress theory Maximum Principal strain theory Maximum shear stress theory Maximum strain energy theory Maximum shear strain energy theory.

Text Books

1. Introduction to text book of Strength of materials by R.K. Bansal Laxmi publications Pvt. Ltd., New Delhi.
2. Introduction to text book of Strength of Material by U.C. Jindal, Galgotia publications.

References

1. Mechanics of Solid, by Ferdinand P Beer and others Tata Mc Graw Hill Publications 2000.
2. Strength of Materials by Schaum's out line series Mc GrawHill International Editions.
3. Strength of Materials by S. Ramakrishna and

R.Narayan, Dhanpat Rai publications.
4. Strength of materials by R.K. Rajput, S. Chand & Co, New Delhi.
5. Strength of Materials by A.R. Basu, Dhanpat Rai & Co, Nai Sarah, Delhi.
6. Strength of Materials by L.S. Srinath et al., Macmillan India Ltd., Delhi.
7. Strength of materials by R. Subramanian, Oxford university press, Delhi

Course Outcomes

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

1. Determine stress and strain for members subjected to direct loads and strain energy due to impact loads.
2. Draw shear force and bending moment diagrams for determinate beams subjected to loads.
3. Explain concept of bending equation and calculate flexural and shear stresses.
4. Calculate slope and deflection for beams under given loads.
5. Determine Principal stresses and strains. To explain the various theories of failure.

(A30102) FLUID MECHANICS

B. Tech. (CE) – III Semester

L	T	P	C
2	1	0	3

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

UNIT-II

Fluid Kinematics: Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows : Steady, unsteady, uniform, non uniform, laminar, turbulent, rotational and irrotational flows, Equation of continuity for one, two , three dimensional flows, stream and velocity potential functions, flownet analysis.

UNIT-III

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

UNIT-IV

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 deviations BL in transition, separation of BL, control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

UNIT-V

Closed Conduit Flow: Reynold's experiment - Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long tubes, flow through inclined tubes. Laws of Fluid friction

- Darcy's equation, Minor losses - pipes in series- pipes in parallel - Total energy line and hydraulic gradient line. Pipe network problems, variation of friction factor with Reynold_s number _ Moody's Chart.

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.)
3. Introduction to Fluid Machines by Edward J. Shaughnessy, Jr, Ira
   M. Katz and James P. Schaffer , Oxford University Press, New Delhi

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
4. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal – Laxmi Publications (P) ltd., New Delhi

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

1. Explain physical properties of fluid, pressure, hydrostatic forces on submerged surfaces
2. Explain classification of flows, equation of continuity,

stream and velocity potential functions.

3. Derive Euler's, Bernoulli's equations, Navier Stokes equation, determine velocity in the pipes and classify orifices
4. Explain the boundary layer concept, Prandtl contribution, Von Karmen momentum equation, – Magnus effect.
5. Describe Reynolds's experiments, and derive Darcy's equation, losses in pipes and Moody's Chart.

(A30103) SURVEYING & GEOMATICS

B.Tech (CE) III Semester

L	T	P	C
3	0	0	3

UNIT-I

Introduction: Overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications, Scales, Conventional Symbols, Signals

Distances and Direction: Distance measurement methods; use of chain, tape and Electronic distance measurements, Meridians, Azimuths and Bearings, declination, computation of angle.

UNIT-II

Leveling and Contouring: Concept and Terminology, Temporary adjustments- method of leveling. Characteristics and Uses of contours- methods of conducting contour surveys and their plotting.

UNIT-III

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

Unit –IV

Theodolite: Theodolite, description, uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite. Trigonometrical leveling, Traversing.

UNIT-IV

Tacheometric Surveying: Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff

vertical position.

Curves: Types of curves, design and setting out – simple and compound curves.

Text Books

1. Dr. K.R. Arora, Surveying Vo.I, Standard Book House, 6th edition, 2000
2. Punmia, Surveying Vol.I, Standard Book House, 9th edition, 1985

Reference Books

1. S.K.Duggal, Surveying Vol.I, Tata Mcgraw Hill, 2nd edition
2. Surveying and levelling by R.subramanian,second Edition,Oxford University press-2012
3. Surveying and levelling by R. Agor. Khanna Publishers

Course Outcomes

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

1. Determine distance and direction with survey instruments.
2. Apply the principles of leveling and contouring.
3. Apply computation methods for measuring the Areas and Volumes with survey instruments.
4. Explain about theodolite and tacheometric Surveying.
5. Explain about the Geomatics application in surveying

(A30104) ENGINEERING MATERIALS & GEOLOGY

B.Tech (CE) III Semester

L	T	P	C
2	0	0	2

UNIT-I

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

Stones: Qualities of a good building stone; Stone quarrying; Tools for blasting; Materials for blasting; Process of blasting; Precautions in blasting; Dressing of stones; Common building stones of India.

Bricks: General; Composition of good brick earth; Harmful ingredients in brick earth; Classification of brick earth; Manufacture of bricks; Comparison between clamp burning and kiln burning; Qualities of good bricks; Tests for bricks; Classification of bricks

UNIT-II

Mineralogy: Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

Petrology: Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

UNIT-III

Structural Geology: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints - their important types. 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. Landslides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and landslides.

UNIT-IV

Geology of Dams Reservoirs: Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factors Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs. 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-V

Tunnels: Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (lithological, structural and ground water) in tunneling over break and lining in tunnels. Tunnels in rock, subsidence over old mines, mining substances

Text books

1. Engineering Geology by N. Chennkesavulu, McMillan,

India Ltd. 2nd addition
2. Principals of Engineering Geology by K.V.G.K. Gokhale – B.S publications
3. Engineering Geology by Subinoy Gangopadhyay. Oxward University press

Reference Books

1. Engineering Geology for Civil Engineering, P.C.Varghese, PHI Learning& private Limited
2. Geology of Engineering by Aurele Parriaux, CR C Press
3 F.G. Bell, Fundamental of Engineering Geology Butterworths, Publications, New Delhi, 1992.
4 Krynine & Judd, Principles of Engineering Geology &Geotechnics, CBS Publishers & Distribution,

Course Outcomes

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

1. Explain the construction materials and relationship between Rocks and soils, weathering process influence on Civil Engineering works.
2. Discuss the properties of minerals and rocks on their identification.
3. Explain Geological Structures and identification in the field.
4. Apply the Geophysical Studies and interpret in selection of Civil Structures (Dams, Tunnels and Reservoirs)
5. Explain surface and sub-surface water movement in Geological influence on movement process and geo-hazardous

(A30105) BUILDING CONSTRUCTION, PLANNING AND DRAWING

B.Tech (CE) III Semester

L	T	P	C
2	0	2	3

BUILDING CONSTRUCTION

UNIT-I

Stone Masonry: Technical terms; Classification of stone masonry.

Brick Masonry: Technical terms; Types of bonds in brickwork and their suitability, Plan, elevation and section of brick bonds up to two bricks

Timber: Definition; Classification of trees; Structure of a tree; Qualities of good timber; Seasoning of timber; Advantages of timber construction;

UNIT-II

Paints, Varnishes and Distempers: General; Painting; Varnishing; Distempering; Wall paper; White washing; Colour washing.

Foundations: Concept of foundations; Factors affecting selection of foundations; Types of foundations; Strip, Isolated, Strap, Combined Footings, Raft –Mat –Slab and Beam Raft, Piles and their classification; Foundation on black cotton soils.

BUILDING PLANNING AND DRAWING

UNIT-III

Basic Architecture of Buildings: Aspect-Prospect -Privacy-Furniture requirement–Roominess–Grouping–Circulation–Sanitation-Lighting-Ventilation-Cleanliness-Flexibility-Elegance-Economy-Practical considerations. Classification of buildings –Open space requirements – built up area limitations –Height of Buildings –Wall thickness. Objectives of building byelaws, Principles underlying building byelaws.

Foundations Drawings:

Drawings: Foundation for walls and columns; Footing for a RCC column, raft and pile foundations;

UNIT-IV.

Residential Buildings: Minimum standards for various parts of

buildings –requirements of different rooms and their grouping – characteristics of various types of residential buildings. Introduction –
Terminology –Objectives of building byelaws –Floor Area Ratio (FAR) –Floor Space Index (FSI)
Functional Drawing of Buildings: To draw the line diagram, plan, elevation and section of the following: Residential Buildings (flat, pitched and combined roofs).

UNIT-V
Stairs: Proportioning and design of a dog-legged, open well RCC stair case for an office / Residential building; Details of reinforcements for RCC stair cases; Plan and elevation of straight run, quarter turn, dog- legged and open well stair cases.
Roofs and Trusses : Technical terms; Classification of roofs; Types of sloping roof, Drawing of RCC roof with details of reinforcements, King post and Queen post trusses.

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
3. Principles of Building Drawing Shah & Kale

References

1. Building Materials by Duggal, New Age Internationals.
2. Building Construction by PC Verghese PHI.
3. Construction Technology - Vol - I & II by R.Chuddy, Longman UK.
4. Basics of Civil Engg by Subhash Chander; Jain Brothers.
5. Alternate Building materials and Technology, K.S.Jagadish, Venkatarama Reddy and others; New Age Publications.
6. NBC guide line for building construction

Course Outcomes

Upon completion of the course students will have knowledge:

1. Discuss the building construction methods
2. List and explain different construction activities in the building construction
3. Draw line diagram, plan, elevation and sections.
4. Draft any component of a building.

(A30226) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to CSE, CE & MECH)

B.Tech (CE) III Semester

L	T	P	C
3	0	0	3

UNIT-I

Electrical Circuits

Basic definitions, Types of elements, Ohm's Law, Resistive networks, Kirchhoff's Laws, Inductive networks, capacitive networks, Series, Parallel circuits and Star-delta and delta-star transformations, mesh and nodal analysis, network theorems – super position ,thevenin's ,maximum power transfer theorem, simple problems.

Instruments: Basic Principle of indicating instruments – permanent magnet moving coil and moving iron instruments.

UNIT-II

DC Machines Principle of operation of DC Generator & motor – EMF equation - types – DC motor types –torque equation – applications – three point starter.

UNIT-III

Transformers: Principle of operation of single phase transformers – EMF equation – losses – efficiency and regulation. **AC Machines:** Principle of operation of induction motor – slip – torque characteristics – Applications. Principle of operation of alternators – regulation by synchronous impedance method.

UNIT-IV

Diodes: P-n junction diode, symbol, V-I Characteristics, Diode Applications, and Rectifiers – Half wave, Full wave and Bridge rectifiers (simple Problems). Transistors: PNP and NPN Junction transistor, Transistor as an amplifier, SCR characteristics and applications.

UNIT-V

Cathode Ray Oscilloscope: Principles of CRT (Cathode Ray Tube), Deflection, Sensitivity, Electrostatic and Magnetic deflection, Applications of CRO - Voltage, Current and frequency measurements.

Text Books

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J NagarathMcGraw Hill Education

References

1. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabratajit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw 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.
5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications. 6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.

Course Outcomes

On completion of the course, students will be able to

1. Analyze the basic electrical circuits, parameters, measuring instruments
2. Explain the operation of the transformers in the energy conversion process,
3. Explain construction, operation, and characteristics of DC and AC machines
4. Describe different semiconductor devices, their voltage-current characteristics, realization of various electronic circuits with the various semiconductor devices, and cathode ray oscilloscope.

(A30106) SURVEYING LAB – I

B.Tech (CE) III Semester

L	T	P	C
0	0	3	1.5

List of Exercises

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

Course Outcomes

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

1. Prepare the map of field details and find the area of field by conducting chain surveying.
2. Prepare the map of field details and find the area of field by conducting compass surveying.
3. Prepare the map of field details and find the area of field by conducting table surveying.
4. Find the elevation of field points for the preparation of contour map by conducting leveling.

(A30107) STRENGTH OF MATERIALS LAB

B.Tech (CE) III Semester

L	T	P	C
0	0	3	1.5

LIST OF EXPERIMENTS

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

Course Outcomes

After completion of the course, the student shall be able to:

1. Calculate modulus of Elasticity for given material from the Tension test, deflection test on simply supported, cantilever and continuous beams. To verify Maxwell's reciprocal theorem on given beam.
2. Calculate direct stress (normal and shear) from Compression and Shear tests on given specimen.
3. Calculate modulus of rigidity of given material from Torsion test on circular shaft and spring test.
4. Calculate Impact strength and hardness of given material from Charpy/Izod impact tests and Brinell / Rockwell hardness tests.
5. Calculate strain in given cantilever beam using electrical resistance strain gauge.

(A30021) SOCIAL INNOVATION IN PRACTICE
(Common for all branches)

B.Tech (CE) III Semester

L	T	P	C
0	0	2	1

UNIT-I
Identify community issues to be addressed, Requirements Analysis: Extensive User requirements analysis, generating effective System Requirement document.

UNIT-II
Social Innovation – Case Studies Presentation of the case studies with a focus on impact and vision on society.

UNIT-III
Process of Social Innovation Prompts – identifying needs, Proposals – generating ideas, Prototyping – testing the idea in practice,

UNIT-IV
Sustaining-developing a business model, Scaling and diffusion-growing social innovations, Systematic change.

UNIT-V
Report writing, Documentation and Panel presentation

Reference Books
1. Requirements Analysis: From Business Views to Architecture; David C. Hay; Prentice Hall Professional
2. Social Enterprises: An Organizational Perspective edited; Benjamin Gidron, Yeheskel Hasenfeld; Palgrave Macmillan
3. Social Enterprise Law: Trust, Public Benefit and Capital Markets By Dana Brakman Reiser & Steven A. Dean

Course Outcomes
On Completion of the course, the students will be able to
1. Sum up various social issues to be addressed
2. Analyse the feasibility and economical factors
3. Develop a scalable business model.

(A30014) ENVIRONMENTAL SCIENCES

(Common to All Branches)

B.Tech (CE) III Semester	**L**	**T**	**P**	**C**
	2	**0**	**0**	**0**

UNIT-I

Environmental Studies:

Introduction, Definition, scope and importance, Ecosystems: Introduction, types, characteristic features, structure and functions of ecosystems, Bio-geo chemical cycle, Classification of Eco system.

UNIT-II

Natural Resources: Classification of Resources, Land resources, Land as resource, Common property resources, Land degradation, Soil erosion and desertification, Effects of modern agriculture, fertilizer – pesticide problems, Forest resources, Use and over-exploitation.

Mining and dams – their effects on forest and tribal people, Water resources, Use and over- utilization of surface and groundwater, Floods, droughts, Water logging and salinity, Dams –benefits and costs, Conflicts over Water, Energy resources.

UNIT-III

Bio-diversity and its conservation, Value of bio-diversity - consumptive and productive use, social, ethical, aesthetic and option values, Bio- geographical classification of India – India as a mega diversity habitat, Threats to bio-diversity – Hot-spots, habitat loss, poaching of wild life, loss of species, seeds, etc. Conservation of bio-diversity– In-situ and Ex-situ conservation.

UNIT-IV

Environmental Pollution –Local and Global Issues, Nature of thermal pollution and nuclear hazards, Global warming, Acid

rain, Ozone depletion, Environmental case studies.

UNIT-V

Environmental Problems in India, Drinking water, sanitation and public health, Effects of the activities on the quality of environment, Water scarcity and groundwater depletion, Controversies on major dams – resettlement and rehabilitation of people: problems and concerns, Rain water harvesting, cloud seeding and watershed management. Economy and Environment, The economy and environment interaction, Economics of development, preservation and conservation, Sustainability: theory and practices, Limits to growth, Equitable use of resources for sustainable life styles, Environmental Impact Assessment.

Text Books

1. Environmental Science - Y.Anjaneyulu, B S Publications.
2. Environmental studies-Deeksha dave, Cengage learning India Pvt. Ltd.,
3. Environmental sciences and Engineering - P. Venugopal Rao, PHI learning Pvt. Ltd.,
4. Environmental Science and Technology by M. Anji Reddy, B S Publications.

Reference books

1. Clark, R.S., Marine Pollution, Clanderson Press, Oxford, 2002.
2. Cunningham, W.P., et al., Environmental Encyclopedia, Jaico Publishing House, Mumbai, 2003.

Course Outcomes

On successful completion of this course, the students should be able to

1. Discuss on environment.
2. List and explain various Natural Resources
3. Develop skills in understanding of various environmental problems
4. Develop skills to protect the Environment

SEMESTER IV

(A30007) NUMERICAL TECHNIQUES, PROBABILITY & STATISTICS

B.Tech (CE) IV Semester	L	T	P	C
	3	1	0	4

UNIT-I: NUMERICAL METHODS-I

Solution of polynomial and transcendental equations: Bisection method, Iteration method, Newton-Raphson method and Regula-False method.

Interpolation: Finite differences, Forward differences, Backward differences, Central differences, Symbolic relations and separation of symbols, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation, Gauss's forward and backward formulae, Lagrange's method of interpolation.

UNIT-II: NUMERICAL METHODS-II

Numerical integration : Trapezoidal rule, Simpson's 1/3rd and 3/8 rules.

Numerical Solutions of Ordinary Differential Equations -Taylor's series, Picard's method, Euler and modified Euler's methods, Runge-Kutta method of fourth order.

UNIT-III: LAPLACE TRANSFORMS

Laplace transform of standard functions, First shifting theorem, Laplace transforms of functions when they are multiplied and divided by't'. Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transforms of special functions, Laplace transform of periodic functions. Inverse Laplace transform by different methods, Convolution theorem (without Proof), Solving ODEs by Laplace transform method.

UNIT- IV:

RANDOM VARIABLES & DISTRIBUTIONS

Random Variables: Discrete and continuous random variables.

Distributions: Binomial distribution, Poisson distribution and their

Properties, Normal distribution, Sampling distribution of means (σ - known and unknown).

UNIT- V: TEST OF HYPOTHESIS

Test of hypothesis, Null hypothesis, Alternative hypothesis, Type-I & II errors, Critical region, Confidential interval for the mean & proportions. Test of hypothesis for large samples, Single mean, Difference between the means, Single proportion and difference between the proportions. Test of hypothesis for Small samples, Confidence interval for the t- distribution, Tests of hypothesis t -test, F-test, $\chi 2$- test , goodness of fit.

TEXT BOOKS :

1. Higher Engineering Mathematics (36^{th} edition) by B.S. Grewal, Khanna Publishers.
2. Fundamentals of Mathematical Statistics(11^{th} Edition) by S.C.Gupta& VK Kapoor, Sultan Chand & Sons.

REFERENCE BOOKS :

1. Advanced Engineering Mathematics (3^{rd} edition) by R.K. Jain & S.R.K. Iyengar, Narosa Publishing House, Delhi.
2. Introductory Methods of Numerical Analysis , S.S.Sastry, 4h Edition, Prentce Hall of India Pvt. Ltd.
3. Advanced Engineering Mathematics (9^{th} edition) by Erwin Kreyszig John Wiley & Sons Publishers.
4. Probability & Statistics by T.K.V. Iyengar, B. Krishna Gandhi & Others, 2015 Yr. Edition S.Chand.
5. Applied Mathematics for Engineers & Physicists (3^{rd} edition) by Pipes & Harvill , McGraw Hill Internation Book company.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Find the root of given equation and estimate unknown value using interpolation.
2. Find numerical solutions of ordinary differential equations.
3. Solve ordinary differential equations using Laplace transform.
4. Analyse random variables involved in probability models.
5. Test hypothesis for large and small samples.

(A30108) STRENGTH OF MATERIALS – II

B.Tech (CE) IV Semester

L	T	P	C
2	1	0	3

UNIT-I

Torsion of Circular Shafts: Theory of pure torsion Derivation of Torsion equations: $T/J = \tau/r = G\theta/L$, 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. Perrys Formula. Beam columns; laterally loaded struts, subjected to uniformly distributed and concentrated loads Maximum B.M. and stress due to transverse and lateral loading.

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 B.M, Core of a section determination of stresses in the case of chimneys, retaining walls and dams conditions for stability stresses due to direct

loading and B.M. about both axis.

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

Unsymmetrical bending: Introduction- Centroidal principal Axis of section- Graphical Method for locating Principal axis – Moment of Inertia referred to any set of rectangular axis-Stresses in beams subjected to Unsymmetrical bending-Principal Axis-Resolution of bending movements in to two rectangular axis through the Centriod – Location of N.A – Deflection of Beams under Unsymmetrical bending. Shear centre :Introduction –Shear centre for symmetrical and Unsymmetrical(Channel, I,T and L) sections

UNIT-V

Thin Cylinders: Thin seamless cylindrical shells- Derivation of the formula for longitudinal and circumferential stress-hoop, longitudinal and volumetric strains- change in diameter and volume of thin cylinders- Thin spherical shells

Thick Cylinders: Introduction, Lame's theory for thick cylinders- Derivation lame's formula- Distribution of hoop and radial Stresses across thickness-design of thick cylinders-Compound cylinders- Necessary difference of radii for shrinkage- Thick spherical shells.

Text Books

1. A Text book of Strength of materials by .K.Bansal, Laxmi Publications (P) Ltd., New Delhi
2. Introduction to Strength of Materials by U.C. Jindal, Galgotia publications.
3. Strength of Materials by B.C. Punmia

Reference Books

1. Mechanics of Solid, by Ferdinand P Beer and others Tata Mc.Graw-Hill Publications 2000.
2. Strength of Materials by Schaums Out line Series Mc Graw Hill International Editions.

Course Outcomes

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

1. Explain the concept of torsion equation and calculate torsional shear stresses for shafts and helical and leaf springs.
2. Calculate critical load for columns of varying end conditions and analyze beam columns.
3. Calculate stresses under combined loading for chimneys, retaining walls and dams and analyse curved beams.
4. Analyse beams subjected to unsymmetrical bending and locate the shear centre.
5. Analyse and design thin and thick cylinders and spherical shells.

(A30109) HYDRAULICS AND HYRAULIC MACHINERY

B.Tech (CE) IV Semester

L	T	P	C
3	0	0	3

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 - critical sub- critical and super critical flows.

Non uniform flow-Dynamic equation for Gradually Varied Flow (G.V.F.), Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT-II

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

UNIT-III

Hydrodynamic force of jets: 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. : Layout of a typical Hydropower installation, Heads and efficiencies

UNIT-IV

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

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. Graw Hill Publishers
2. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) ltd., New Delhi
3. Fluid Mechanics & Fluid Power Engineering by D.S. Kumar Kataria & Sons.

References Books

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, and Publications.
3. Fluid mechanics and fluid machines by Rajput, S. Chand &Co.
4. Open Channel flow by V.T. Chow, Mc Graw Hill Book Company.
5. Hydraulic Machines by Banga & Sharma Khanna Publishers

Course Outcomes

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

1. Design open channel sections and to determine parameters of hydraulic jump and back water curve.
2. Employ dimensional analysis in solving problems and plan hydraulic similitude studies.
3. Apply basics of the hydro-machinery and water power engineering concepts.
4. Design impulse and reaction turbines, and conduct model studies for turbines and pumps.
5. Determine performance of Centrifugal pump, evaluate hydroelectric potential, list factors governing operation of power station.

(A30110) ENVIRONMENTAL ENGINEERING

B.Tech (CE) IV Semester	L	T	P	C
	2	0	0	2

UNIT-I

Introduction: Water supply Schemes- Protected water supply- Population forecasts, design period- water demand- Types of demand – factors affecting-fluctuations- fire demand –Sources of Water- intakes- infiltration galleries, confined and unconfined aquifers- water quality parameters and testing- drinking water standards

UNIT-II

Layout and general outline of water treatment units- sedimentation, uniform setting velocity- principles- design factors- surface loading- jar test –optimum dosage of coagulant- 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- types of disinfection – theory of chlorination –chlorine demand- other disinfection treatment methods. Distribution systems- Types of layouts of Distribution systems – design of distribution systems- Hardy Cross and equivalent pipe methods-service reservoirs- Determination of Storage Capacity.

UNIT-III

Conservancy and water carriage systems- sewage and storm water estimation- time of concentration- storm water overflows combined flow- characteristics of sewage – examination of sewage-B.O.D.-
C.O.D .equations .Design of sewers
Shapes and materials- Sewer appurtenances manholes- inverted siphon- catch basins-flushing tanks- ejectors, pumps and pumping houses- house drainage- components requirements – sanitary fittings- traps-one pipe and two pipe systems of plumbing.

UNIT-IV

Layout and general outline of various units in a waste water treatment plant-primary treatment, design of screens- grit chambers- skimming tanks- sedimentation tanks, principle and design of biological
treatment- trickling filters- standard and high rate Filters, ASP, Asp modification- Aeration.

UNIT-V

Construction and design of oxidation ponds- Oxidation ditches- Sludge Treatment- Sludge digestion tanks-design of digestion tank- Factors affecting sludge digestion- sludge disposal by drying- septic tanks- working principles and design- soak pits. Ultimate disposal of waste water- self-purification of rivers- Sewage farming.

Text books

1. Water supply& Sanitary Engineering by G.S. Birdie.
2. Water supply Engineering, Vol. I waste water Engineering. Vol. II, B.C. Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt.ltd New Delhi.
3. Water Supply Engineering Vol.I& waste water Engineering Vol. II, P.N. Modi, Standard Book Publishers, and New Delhi.

References

1. Waste Water Technology By Mark J Hammer and Mark J Hammer Jr
2. Water and Waste Water Technology by Steel
3. Waste Water Engineering by Fair Geyer and Okun.
4. Waste Water Engineering by Metcalf and Eddy
5. Theory & practice of water & waste water Treatment by Ronald L Drose, Wiley India Publishers

Course Outcomes

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

1. Forecast population growth, water demand, and test water quality parameters.
2. Design water treatment units, disinfection of water and design distribution systems.

3. Estimate sewage, B.O.D and C.O.D. and design sewer appurtenances.
4. Design waste water treatment units.
5. Design oxidation ponds, sludge digestion and treatment, ultimate disposal of waste water.

(A30111) CONCRETE TECHNOLOGY

B.Tech (CE) IV Semester

L	T	P	C
2	0	0	2

UNIT-I

Cement: Portland cement- chemical composition- Hydration of cement-Structure of Hydrated cement, Test on physical properties, Different grades of cement.

Admixtures: Types of admixtures, mineral and chemical admixtures-properties-dosages- effects- usage.

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

UNIT-II

Fresh concrete; Workability- Factors affecting workability – Measurement of workability by different tests- Setting times of concrete- Effect of time and temperature on workability- Segregation & bleeding- Mixing and vibration of concrete- steps in manufacture of concrete- Quality of mixing water.

UNIT-III

Hardened concrete- water/cement ratio- Abram's law- Gelspace 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- Split tests- Pull-out test, Nondestructive testing methods-codal provisions for NDT. Elasticity,

Creep& Shrinkage-Modulus of elasticity- Dynamic modulus of elasticity- Poisson's ratio-Creep of concrete- Factors influencing creep- Relation between creep & time- Effects of creep- Shrinkage-types of shrinkage.

UNIT- IV

Mix Design: Factors influencing the choice of mix proportions-Durability of concrete-Quality Control of concrete- Statistical Quality Control- Acceptance criteria- Proportioning of concrete mix by normal and pumpable concretes by BIS method of mix design – Formwork – different types of formworks – selection of formwork for different concrete works.

UNIT-V

Special Concretes: Light weight concrete-Light weight aggregate concrete- Cellular concrete- No-fines Concrete- Fibre reinforced concrete- Polymer concrete- Types of polymer 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
3. Concrete Technology by A.R. Santakumar, Oxford University Press, New Delhi

References

1. Concrete Technology by Job Thomas, Cengage Learning
2. Concrete Technology by M.L. Gambhir, Tata McGraw Hill publishers, New Delhi.
3. Concrete Micro structure, Properties and Materials-P.K. Mehta and
4. J.M. Monterio, McGraw Hill publishers.
5. IS 10262 (2009) Indian Standard Concrete Mixed Proportionally guidelines (2009) I Version.

Course Outcomes

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

1. Discuss properties of all ingredients in concrete including admixtures.
2. Determine the properties of Fresh and Hardened concrete.
3. Design various mix proportions of concrete and learn the importance of Durability.
4. List and discuss various special concretes and their applications.

(A30112) STRUCTURAL ANALYSIS - I

B.Tech (CE) IV Semester

L	T	P	C
2	1	0	3

UNIT-I

Analysis of Perfect Frames: Types of frames - Perfect. Imperfect and redundant pin jointed frames. - Analysis of determinate 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. Definitions of simple beams and pin- jointed plane trusses. Definitions of statically determinate bent frames.

Three Hinged Arches - Introduction- Types of Arches - Comparison between three hinged and two 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: Analysis of propped cantilever and fixed beams, including the beams with varying 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 rotation of a support.

UNIT-IV

Slope - Deflection Method and moment Distribution Method:

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. Derivation of slope- deflection equation, application to continuous beams with and without settlement of supports using Moment Distribution Method. Shear force and bending moment diagrams, Elastic curve.

UNIT-V

Moving Loads and Influence Lines: Introduction maximum SF and BM at a given section and absolute maximum SF 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 and 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.

Text Books

1. Structural Analysis Vol - I and II by Vazarani and Ratwani, Khanna Publishers.
2. Structural Analysis Vol I & II by Pundit and Guptha., Tata McGraw Hill Publishers.

Reference Books

1. Basic Structural Analysis by K.U. Muthu et al., I.K. International Publishing House Pvt. Ltd.
2. Structural Analysis by Hibbeler, Pearson Education Ltd
3. Basic Structural Analysis by C.S. Reddy., Tata McGraw Hill Publishers.
4. Fundamentals of structural Analysis by M.L. Gamhir, PHI.

Course Outcomes

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

1. Analyse simple beam and pin jointed trusses.

2. Analyse three hinged arches for primary and secondary loads; Strain energy principles- Castigliano's theorems.
3. Analyse indeterminate beams using three moment theorem, slope deflection and moment distribution methods.
4. Analyse the propped cantilever and fixed beam with different load combination.
5. Analyse beams and trusses under moving loads with and without the aid of influence line diagrams.

(A30113) FLUID MECHANICS & HYDRAULIC MACHINERY LAB

B.Tech (CE) IV Semester	L	T	P	C
	0	0	3	1.5

EXPERIMENTS

Any 10 experiments to be conducted:

1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of Coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted Rectangular Notch and /or Triangular Notch
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli‘s equation.
7. Impact of jet on vanes
8. Performance test on reciprocating pump
9. Performance test on single stage centrifugal pump
10. Performance and Specific speed test on Pelton wheel (or Turbo Wheel)
11. Performance and specific speed test on Francis Turbine
12. Performance and specific speed test on Kaplan Turbine
13. Performance test on multi stage centrifugal pump

Course Outcomes

1. After completion of the course, the student shall be able to:
2. Apply the knowledge in verification of fluid flow and estimate the friction and frictional less in fluid flow.
3. Calibrate discharge measuring devises and finding discharge through the venture meter and the orifice meter
4. Calibrate discharge measuring devises for open channel or free flow like rectangular and triangular notch.
5. Calculate the coefficient of discharge for outlet devises viz small orifices and mouth pieces.
6. Determine performance characteristics of popular turbines and pumps.

(A30114) SURVEYING LAB – II

B.Tech (CE) IV Semester

L	T	P	C
0	0	3	1.5

LIST OF EXERCISES

1. Study of theodolite in detail - practice for measurement of horizontal and vertical angles.
2. Measurement of horizontal angles by method of repetition and reiteration.
3. Trigonometric Leveling - Heights and distance problem (Two Exercises)
4. Heights and distance using Principles of tachometric surveying (Two Exercises)
5. Curve setting: different methods. (Two Exercises)
6. Setting out works for buildings & pipe lines.
7. Determine of area using total station
8. Traversing using total station
9. Contouring using total station
10. Determination of remote height using total station
11. State-out using total station
12. Distance, gradient, Diff, height between tow inaccessible points using total stations

Course Outcomes

After completion of the experiments in this lab, the student shall be able to:

1. Find the horizontal distances, heights and elevations by conducting theodolite surveying.
2. Find the horizontal distances, heights and elevations by conducting tachometric surveying.
3. Set out the simple circular curves in the field for roads and railway lines by linear and angular instruments.
4. Find the horizontal distances, heights and elevations by conducting total station surveying.

(A30016) GENDER SENSITIZATION
(An Activity-based Course)

B.Tech (CE) IV Semester	**L**	**T**	**P**	**C**
	0	**0**	**2**	**0**

UNIT-I
Understanding Gender
Lesson 1 – Gender: Why should we study it?
Lesson 2 – Socialization: Making Women, Making Men Lesson 12 – Just Relationships: Being together as Equals

UNIT-II
Gender and Biology
Lesson 4 – Missing Women: Sex selection and its consequences Lesson 10 – Gender Spectrum: Beyond the Binary
Lesson 13 – Additional Reading: Our Bodies, Our Health

UNIT-III
Gender and Labour
Lesson 3 – Housework: The Invisible Labour
Lesson 7 – Women's Work: Its Politics and Economics

UNIT-IV
Issues of Violence
Lesson 6 – Sexual Harassment: Say No! Lesson 8 – Domestic Violence: Speaking Out Lesson 11 – Thinking about Sexual Violence

UNIT-V
Gender Studies
Lesson 5 – Knowledge: Through the Lens of Gender
Lesson 9 – Who's History? Questions for Historians and Others.

Course Outcomes
On completion of the course, students will be able to
1. Identify realities of gender discrimination prevalent in

the society at all levels.

2. Infer and discuss historical evidences, perspective and voices of discrimination against women in all societies and civilizations..
3. Identify, protest and overcome the evils of body shaming.
4. Analyze discrimination and exploitation of women labour in domestic as well as social sphere. Learners infer women's rights, women's wage disparities, women's issues and demonstrate these grievances through law.
5. Identify different types of sexual exploitation; sexual violence and marital violence show empathy towards victims of such violence and generate public opinion in face of any exploitation

V SEMESTER

(A30013) BUSINESS MANAGEMENT & FINANCIAL ANALYSIS

B.Tech (CE) V Semester	L	T	P	C
	4	0	0	4

UNIT – I Introduction of Management Concepts: Concept, Origin, Growth, Nature, Characteristics, Scope and Principles of Management. Functions of Management: Planning, Organizing, Staffing, Directing, Coordinating, Reporting and Budgeting. Scientific Management- FW Taylor Contributions to Management Modern Management- Henry Fayol Contributions to Management Human Relations Approach to Management: Theories of Motivation and Leadership

UNIT – I Functional areas of Management: Production Management: Systems of Production, PPC functions & Plant Layout. Financial Management: Objectives, Goals, & Functions of Financial Management. Marketing Management: Recent Trends in Marketing & Marketing Mix. Human Resources Management: Nature, Objectives, Scope & Functions of HR Management

UNIT – III Introduction to Managerial Economics & Business Environment: Definition, Nature, Scope and Functions Managerial Economics, Difference between Micro & Macro Economics Internal & External Scanning of Business Environment, Importance of National Income, Inflation, Deflation, Stagflation, Business Cycle & Product Life Cycle Concepts. Concept & Law of Demand, Factors Influencing and Limitations. Concept of Elasticity of Demand, Types of Elasticity, Methods of Measuring Elasticity. Introduction to Demand Forecasting, Objectives, Scope, Types and Methods.

UNIT –IV Theory of Production, Cost, Price & Markets: Production Function, Assumptions, Limitations & Types Cost Concepts, Cost-Output Relationship, Break Even Analysis

Assumptions, Limitations & Applications (Simple Problems). Theory of Pricing, Objectives, Situations & Types. Introductions Markets, Demand-Supply Schedule for Equilibrium Price, Nature & Types of Competition.

UNIT – V Introduction to Financial Statement Analysis: Types & Objectives of Business Enterprises, Conventional & Non-Conventional Sources of Financing Business Enterprise. Identification of Financial Statement Formats-Manufacturing A/c, Trading A/c, Profit & Loss A/c, Balance Sheet. Techniques of Analyzing Financial Statements: Analysis & Interpretation through Liquidity, Leverage, Coverage, Activity, Turnover, Profitability Ratios-Simple Problems on Liquidity, Leverage and Activity Ratios

Course Outcomes: At the end of the course, the student will

- Apply Knowledge of management theories & practices to solve business decisions
- Ability to integrate functional departments of an organization
- Ability to understand business environment for making critical decisions in a business.
- Identifies factors involved in production and markets.
- Ability to analyse financial position of a firm.

Text Books:

1. Varshney, Maheswari (2003), Managerial Economics, Sultan Chand, New Delhi,India.
2. Stoner, Freeman, Gilbert, Management, 6th Ed, Pearson Education, New Delhi, 2004.

Reference Books:

3. Kotler Philip & Keller Kevin Lane: Marketing Mangement 12/e, PHI, 2005
4. Koontz &Weihrich: Essentials of Management, 6/e, TMH, 2005 Thomas N.Duening& John M.Ivancevich Management—Principles and Guidelines, Biztantra, 2003.
5. Ambrish Gupta (2004), Financial Accounting for Management, Pearson Education, New Delhi, India.

6. Domnick Salvatore (2011), Managerial Economics in a Global Economy, 7th edition, Oxford University Press, United States of America.
7. Narayanaswamy (2005), Financial Accounting, A Managerial Perspective, Prentice Hall of India private Ltd, New Delhi, India.
8. Aryasri (2005), Managerial Economics and Financial Analysis, 2nd edition, Tata McGraw Hill, New Delhi, India

(A30115) DESIGN AND DRAWING OF RCC STRUCTURES

B.Tech (CE) V Semester

L	T	P	C
2	0	2	3

Course Objectives

- To help students to understand the fundamental principles and procedures of reinforced concrete design;
- To Help students learn to apply the principles of reinforced concrete design to real world problems; and
- To prepare students for entry level structural engineering employment.

Unit - I

Concepts of RC Design – Limit State method - Material Stress - Strain Curves - Safety factors - Characteristic values. Stress Block parameters - IS - 456 - 2000 - Working Stress Method.
Beams: Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.

Unit - II

Shear, Torsion and Bond: 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 Limit state design for serviceability for deflection, cracking and codal provision.

Unit - III

Design of Two- way slab, one way slab and continuous slab Using IS Coefficients, Cantilever slab / Canopy slab.

Unit - IV

Design of columns - Short and Long columns - axial loads, uni-axial and biaxial bending IS Code provisions.

Unit - V

Design of Footings- isolated (square, rectangular) and combined footings. Design of stair case.

Text books:

1. Limit state design of reinforced concrete - P.C.Varghese, Prentice Hall of India, New Delhi.
2. Reinforced concrete design by N.Krishna Raju and R.N. Pranesh. New age International Publishers, New Delhi
3. RCC Design, Laxmi Publications (LP) by B.C. Punmia (Author), Ashok Kumar Jain (Author), Arun Kumar Jain
4. Reinforced concrete design by S.UnnikrishnaPillai&DevadasMenon, Tata Mc.Graw Hill, New Delhi.
5. Fundamentals of reinforced concrete by N.C.Sinha and S.K.Roy, S.Chand publishers.
6. Design of RC Foundations by P.C.Varghese, PHI

References:

1. Fundamentals of Reinforced concrete design by M.L.Gambhir, Printice Hallo of India Ltd., New Delhi.
2. Reinforced concrete structural elements - behaviour, Analysis and design by P.Purushotham. Tata Mc.Graw - Hill , 1994
3. IS SP 34 : Handbook On Concrete Reinforcement And Detailing (With Amendment 1)

Course Outcomes:

1. Explain comprehend the concept of limit states design method for collapse and serviceability, material properties and behaviour.
2. Design Reinforced Concrete Flexural members - Beams, Slabs, Footings under bending, Shear and torsion.
3. Design Reinforced concrete compression numbers - Columns under combined action of axial load and bending.
4. Calculate crack width and long term reflections as per limit state of serviceability.

Notes:

Students would be allowed to use the following handbooks and or codes of practice in the internal as well as the university examination.

1. IS 456:2000 Indian standard 'Plain And Reinforced Concrete - Code Of Practice' (Fourth Revision)
2. SP 16 (1980): Design Aids for Reinforced Concrete to IS 456:1978. Extracts from this handbook are required to solve problems in the design of uniaxial and biaxial bending of RC Columns
3. Semester end examination would test the skill of the student on the design, detailing and drawing of RCC Members. To achieve this objective, Semester end examination would have a compulsory section exclusively dedicated to design, detailing and drawing of one of the following RC members namely beams, slabs, columns, footings and stairs. The questions in the other section would focus on the understanding of the principles and concepts, analysis and design oriented problems.

(A30116) GEOTECHNICAL ENGINEERING

B.Tech (CE) V Semester

L	T	P	C
2	1	0	3

Course Objectives

1) Able to understand the principles of soil mechanics and application in engineering practices.
2) Able to estimate the relation between engineering properties and their characteristics which control these properties.
3) Able to elucidate the laboratory methods to find out soil properties.
4) Able to apply basic analytical procedures to obtain the engineering quantity and understand their limitations.

Unit – I

Introduction: Origin- 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. In-situ permeability tests (pumping-in and pumping-out tests)

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

Unit – III

Stress Distribution in Soils: Boussinesq's and Westergaard's theories for point loads and areas of different shapes – Newmark's influence chart.

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

Unit – IV

Consolidation : Spring analogy-Void ratio and effective stress (e vs log p relationship- Terzaghi's theory of one dimensional consolidation – Assumptions and derivation of Governing Differential Equation (GDE)-

Computation of magnitude of settlement and time rate of settlement

Unit – V

Shear Strength of Soils : Importance of shear strength-Mohr's – Coulomb's Failure theories – Shear Parameters-Laboratory tests for determination of strength tests –Direct shear test, Tri-axial compression test(UU,CU and CD) and unconfined compression tests-Vane shear test. Factors affecting shear strength of cohesion less and cohesive soils.

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 Engineering . By K.R. Arora, Standard Publishers and Distributors, Delhi. Ltd., New Delhi
3. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).
4. Soil Mechanics and Foundation Engineering. By V.N.S. Murthy, CBS Publishers and Distributors.
5. Principles of geotechnical Engineering by B.M. Das, Cingage learning publishers

References:

1. Soil Mechanics and Foundation by by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt.
2. Soil Mechanics – T.W. Lambe and Whitman, Mc-Graw Hill Publishing Company, Newyork.
3. Geotechnical Engineering by Purushotham Raj
4. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc. Graw hill Publishers New Delhi.

Course Outcomes:

1. Explain the relevant engineering properties of soils and their characteristics and describe the factors which control these properties.
2. Estimate the permeability and seepage though soils
3. Explain the stresses on the soil and compaction properties of soil
4. Explain consolidation and shear strength of the soils**.**

(A30117) TRANSPORTATION ENGINEERING- I

B.Tech (CE) V Semester

L	T	P	C
3	0	0	3

Course Objectives

- Study the behavior of pavements under various loads able to design the flexible and rigid pavements using different Empirical, semi-empirical and theoretical approaches
- Learn the characteristics, properties and testing procedures of highway materials such as soil, aggregate and bitumen

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 & Regulations: Basic Parameters of Traffic- Volume, Speed and Density- Traffic Volume Studies- Data Collection and Presentation- speed studies- Data Collection and Presentation-Origin & Destination Studies, Parking Studies – On Streets & Off-street Parking- Road Accidents- Causes and Preventive Measures- Accident Data Recording – Condition Diagram and Collision Diagrams-Traffic Signs – Types and Specifications – Road Markings- Need for Road Markings- Types of Road Markings- Design of Traffic Signals- Webster Method.

Unit – IV

Intersection Design: Types of Intersections – Conflicts at Intersections- Requirements of At-Grade Intersections- Types of At-Grade Intersections- Channelized and Unchannelized Intersections—Traffic Islands -Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary – Design Factors of Rotary- Advantages and Limitations of Rotary Intersections

Unit- V

Highway Material, Construction and Maintenance: Highway Material Characterization: Sub grade Soil, Stone Aggregates, Bitumen Materials. Construction of Gravel Roads- Construction of water Bound Macadam Roads- Construction of Bituminous Pavements: Surface Dressing, Bitumen Bound Macadam, Bituminous Concrete- Construction of Cement Concrete Pavements- Construction of joints on cement Concrete Pavements-joint Filler and Seal- Pavement Failures- Maintenance of Highways- Highway Drainage.

Text books:

1. Highway Engineering – S.K.Khanna & C.E.G. Justo, Nemchand & Bros., 7th edition (2000).
2. Railway Engineering – A text book of Transportation Engineering – S.P. Chadula – S. Chand & Co. Ltd. – (2001).
3. Highway Engineering Design – L.R. Kadiyali and Lal- Khanna Publications.
4. Airport Planning and Design- S.K. Khanna and Arora, Nemchand Bros.

5. References:

6. Highway Engineering – S.P.Bindra , DhanpatRai& Sons. – 4th Edition (1981)
7. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna publications – 6th Edition – 1997.
8. Railway Engineering – August – Prabha & Co., 15th Edition – 1994.
9. Air Transportation Planning & design – Virendhra Kumar & Statish Chandhra – Gal Gotia Publishers (1999).

10. Course Outcomes:

11. Explain history of transportation and development roads.

1. Explain geometric design of roads, traffic Engineering & Traffic regulation, Management studies & Intersection design using various methods.
2. Explain plain railway engineering, its component of railway track & its Geometric designs
3. Explain basic requirement for airport & its geometric design

(A30118) STRUCTURAL ANALYSIS -II

B.Tech (CE) VI Semester

L	T	P	C
2	1	0	3

Course Objective

- To develop an understanding of theory and application of the various advanced methods of structural analysis.
- To understand the analytical procedure related to the analysis of building frame by some classical methods viz. Kani's methods and approximate methods of analysis.
- To understand matrix method and its application for computer based analysis of structure.
- To develop the skill to deals with the problems of moving loads in the structures and their analysis techniques.

Unit - I

Moment Distribution Method - Analysis of single Bay Single Story Portal Frames including side sway. Analysis of inclined frames

Kani's Method: Analysis of continuous beams including settlement of supports. Analysis of single bay single storey by Kani's Method including Side sway. Shear force and bending moment diagrams. Elastic curve.

Unit - II

Slope Deflection Method: Analysis of single Bay - Single storey Portal Frames by Slope Deflection Method Including Side Sway. Shear force and bending moment diagrams. Elastic curve.

Two Hinged Arches: Introduction - Classification of Two hinged Arches - Analysis of Two Hinged Parabolic arches - Secondary stresses in two hinged arches due to temperature and elastic shortening of rib.

Unit – III

Approximate Methods of Analysis: Introduction - Analysis of multi-storey frames for lateral loads: Portal Method, Cantilever method and Factor method. Analysis of multi- storey frames for gravity (vertical) loads. Substitute Frame method. Two Cycle Moment Distribution method for approximate analysis of vertical loads- Analysis of Mill bents.

Unit – IV

Matrix Methods of Analysis (*System Approach*): Introduction - Static and Kinematic Indeterminacy - Analysis of continuous beams including settlement of supports up to three degrees of indeterminacy using stiffness method. Analysis of pin-jointed determinate plane frames using stiffness method - Analysis of single bay single storey frames including side sway, using stiffness method. Analysis of continuous beams upto three degree of indeterminacy using flexible method. Shear force and bending moment diagrams. Elastic curve.

Unit - V

Influence Lines for Indeterminate Beams: Introduction - ILD for two span continuous beam with constant and variable moments of inertia. ILD for propped cantilever beams.

Indeterminate Trusses: Determination of static and kinematic indeterminacies - Analysis of trusses having single and two degree of internal and external indeterminacies - Castigliano's second theorem.

Text books:

1. Structural Analysis Vol - I and II by Pundit and Gupta., Tata McGrew Hill Publishers.
2. Indeterminate Structural Analysis by K.U. Muthu et al., I.K. International Publishing House Pvt. Ltd.
3. Advanced Structural Analysis by A.K. Jain, Nem Chand Bros.

4. References:

5. Matrix Analysis of Structures by Singh, Cengage Learning Pvt.Ltd.
6. Structural Analysis by Hibbeler, Pearson Publishing House.
7. Matrix Analysis of Structures by Pundit and Gupta. Tata McGraw Hill Publishers.
8. Structural Analysis Vol - I & II by Vizarani and Ratwani, Khanna Publishers.

9. Course Outcomes

10. Explain fundamental concept and methods of structural analysis.
11. Calculate rotations and displacements, in building frames subjected to vertical and lateral loadings.

12. Generate mathematical expressions involving all possible structural actions.
13. Analyze building framing system and its components under the action of gravity and lateral loads.
14. Identify, formulate and solve engineering problems and to effectively use and apply the computer friendly structural analysis techniques viz. stiffness and flexibility methods to the field problems.
15. Solve the problems of moving loads in the structures.

(A30140) SOLID AND HAZARDOUS WASTE MANAGEMENT
(Professional Elective – I)

B.Tech (CE) V Semester

L	T	P	C
3	0	0	3

Course Objectives:

- To provide comprehensive overview of solid, biomedical and hazardous waste management.
- To provide knowledge on solid waste management design aspects.
- To learn about the different methods of solid waste management.
-

Unit I

Solid waste – sources and engineering classification, characterization, generation and quantification. Transport - collection systems, collection equipment, transfer stations, collection route optimization.

Unit II

Treatment methods - various methods of refuse processing, recovery, recycle and reuse, composting – aerobic and anaerobic, incineration, pyrolysis and energy recovery.

Unit III

Disposal methods – Impacts of open dumping, site selection, sanitary land filling – design criteria and design examples, leachate and gas collection systems, leachate treatment.

Unit IV

Biomedical Waste management – sources, treatment and disposal Hazardous Waste Management- Introduction, Sources, Classification, Physico-chemical, Chemical and Biological Treatment of hazardous waste, regulations.

Unit V

Thermal treatment - Incineration and pyrolysis. Soil contamination and site remediation – bioremediation processes, monitoring of disposal sites.

REFERENCES:

1. Tchobanoglous G., Theissen H., and EIiassen R.(1991), "Solid Waste Engineering - Principles and Management Issues", McGraw Hill, New York.
2. Pavoni J.L(1973)., "Handbook of Solid Waste Disposal".
3. Peavy, Rowe and Tchobanoglous (1985), "Environmental Engineering", McGraw Hill Co. 4th Edition
4. Mantell C.L., (1975), "Solid Waste Management", John Wiley.
5. CPHEEO, Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organisation, Government of India, New Delhi, 2000.
6. WHO Manual on Solid Waste Management.
7. Vesiland A.(2002), "Solid Waste Engineering", Thompson Books.
8. Hazardous waste (management and handling) rules, 2001
9. Biomedical (Handling and Management) Rules 2008

Course outcomes

Upon successful completion of this course, students will be able to

1. Explain about solid waste remedial measures and their importance.
2. Undertake projects related to solid waste management.

(A30141) INDUSTRIAL WASTE WATER TREATMENT
(Professional Elective – I)

B.Tech (CE) V Semester

L	T	P	C
3	0	0	3

Course Objectives:

- The objective of the teacher is to impart knowledge and abilities to the students to:
- Distinguish between the quality of domestic and industrial water requirements and Wastewater quantity generation
- Understand the industrial process, water utilization and waste water generation
- Impart knowledge on selection of treatment methods for industrial wastewater
- Acquire the knowledge on operational problems of common effluent treatment plants.
- Gain knowledge on different techniques and approaches for minimizing the generation and application of Physio chemical and biological treatment methods for recovery, reuse and disposal of industrial wastewater.

Unit – I:

Sources of Pollution - Physical, Chemical, Organic & Biological properties of Industrial Wastes - Difference between industrial & municipal waste waters - Effects of industrial effluents on sewers and Natural water Bodies.

Unit – II:

Pre & Primary Treatment - Equalization, Proportioning, Neutralization, Oil separation by Floating-Waste Reduction-Volume Reduction-Strength Reduction.

Unit-III:

Waste Treatment Methods - Nitrification and De-nitrification-Phosphorous removal -Heavy metal removal - Membrane Separation Process - Air Stripping and Absorption Processes - Special Treatment

Methods - Disposal of Treated Waste Water.

Unit-IV:

Characteristics and Composition of waste water and Manufacturing Processes of Industries like Sugar, Characteristics and Composition of Industries like Food processing Industries, Steel, and Petroleum Refineries.

Unit-V:

Characteristics and Composition of Industries like Textiles, Tanneries, Atomic Energy Plants and other Mineral Processing Industries – Joint Treatment of Raw Industries waste water and Domestic Sewage – Common Effluent Treatment Plants(CETP) – Location, Design, Operation and Maintenance Problems – Economical aspects.

Suggested Text Books:

1. Metcalf & Eddy, "Wastewater engineering Treatment disposal reuse", Tata McGraw Hill.
2. Eckenfelder, W.W., "Industrial Water Pollution Control", McGraw-Hill

Reference Books:

1. M.N. Rao and Dutta – Industrial Waste.
2. Mark J. Hammer, Mark J. Hammer, Jr., "Water & Wastewater Technology", Prentice Hall of India.
3. N.L. Nemerrow –Theories and practices of Industrial Waste Engineering.
4. C.G. Gurnham –Principles of Industrial Waste Engineering.

Course outcomes

1. Explain about the Sources of Pollution
2. Recognize the Pre & Primary Treatment Waste Treatment Methods
3. Explain about the Characteristics and Composition of waste water
4. Explain about the Characteristics and Composition of Industries

(A30142) ENVIRONMENTAL IMPACT ASSESSMENT
(Professional Elective – I)

B.Tech (CE) V Semester

L	T	P	C
3	0	0	3

Course Objectives:

- This subject will cover various aspects of Environment Impact Assessment methodologies, impact of development activities.
- Impact on surface water, Air and Biological Environment, Environment legislation Environment.

UNIT – I

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters. E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis.

UNIT- II

Assessment of Impact of development 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.

UNIT – IV

Environmental Audit & 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

The Environmental Protection Act, The water Act, The Air (Prevention & Control of pollution Act.), Motor Act, Wild life Act. Case studies and preparation of Environmental Impact assessment statement for various Industries.

Course Outcomes:

- Identify the environmental attributes to be considered for the EIA study.
- Formulate objectives of the EIA studies.
- Identify the suitable methodology and prepare Rapid EIA.
- Identify and incorporate mitigation measures.

TEXT BOOKS:

1. Larry Canter – Environmental Impact Assessment, McGraw-Hill Publications
2. Environmental Impact Assessment, Barthwal, R. R. New Age International Publications

REFERENCES:

1. Environmental Pollution by R.K. Khitoliya S. Chand, 2014.
2. Glynn, J. and Gary, W. H. K. - Environmental Science and Engineering, Prentice Hall Publishers
3. Suresh K. Dhaneja - Environmental Science and Engineering, S.K. Kataria & Sons Publication. New Delhi.
4. Bhatia, H. S. - Environmental Pollution and Control, Galgotia Publication (P) Ltd, Delhi.
5. Wathern, P. – Environmental Impact Assessment: Theory & Practice, PublishersRutledge, London, 1992.

(A30119) CONCRETE TECHNOLOGY LAB

B.Tech (CE) V Semester

L	T	P	C
0	0	3	1.5

Course Objectives:

- To test the basic properties ingredients of concrete, fresh and hardened concrete properties.

List of Experiments

1. Specific gravity of cement
2. Bulking of sand
3. Fineness modulus of fine and course aggregate
4. Normal Consistency of finesses of cement
5. Initial Setting Time and Final Setting Time of Cement
6. Soundness of Cement
7. Compressive Strength of Cement.
8. Workability test on concrete by Slump cone
9. Workability test on concrete by Vee-bee.
10. Workability test on concrete by compaction factor test
11. Young's Modulus and compressive strength of concrete
12. Non - Destructive testing on concrete (for demonstration)

List of equipment:

1. Specific gravity and absorption set up
2. Shape tests set up
3. Fineness modulus of fine and course aggregate apparatus
4. Normal consistency of fineness of cement set up
5. Cement setting time equipment

6. Specific gravity and soundness of cement set up
7. Compressive testing machine
8. Workability test on concrete by compaction factor
9. Slump cone and setup
10. Vee-bee apparatus
11. Bulking of sand apparatus
12. Non-destructive testing on concrete

References:

- Concrete Technology by M.S.Shetty.- S. Chand& Co
- Concrete Lab Manual by M.L.Gambhir, _ TATA McGraw Hill

Course Outcomes:

Upon successful completion of this course, student will be able to

1. Determine the bulking of sand.
2. Determine the specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
3. Determine the flakiness and elongation index of aggregates.
4. Determine the consistency and fineness of cement.
5. Determine the specific gravity, setting times, soundness and compressive strength of cement.
6. Determine the workability of cement concrete by compaction factor, slump and Vee – Bee tests
7. Explain the non-destructive testing procedures on concrete.

(A30120) HIGHWAY MATERIAL & ENGINEERING GEOLOGY LAB

B.Tech (CE) V Semester	L	T	P	C
	0	0	3	1.5

Course Objectives:

- To supplement theoretical knowledge and to give an idea of practical application of the engineering geology lab which has been designed to have basics of geological mapping and identification of minerals and rocks.
- To test crushing value, impact resistance, specific gravity and water absorption, percentage attrition, percentage abrasion, flakiness index and elongation index for the given road aggregates.
- To know penetration value, ductility value, softening point, flash and fire point, viscosity and stripping for the given bitumen grade.

I. Highway material

1. Aggregate impact and crushing value
2. Specific gravity and water absorption
3. Attrition Test
4. 4.Abrasion Test
5. 5.Shape Tests
6. Ductility Test and Softening point Test
7. Flash & fire point and Penetration Test

II. Engineering Geology

1. Study of physical Properties and Identification of minerals referred under theory
2. Megascopic and Microscopic description and identification of rocks referred under theory.

3. Megascopic and Microscopic identification of rocks & minerals.
    1. Interpretation and drawing of sections for geological maps showing tilted beds faults, uniformities etc
    2. Simple Structural Geology problems

Course outcomes:

1. Test aggregates and judge the suitability of materials for the road construction

2. Test the given bitumen samples and judge their suitability for the road construction

3. Compute the optimum bitumen content for the mix design.

4. Explain ground surface features based on map patterns of contour within the framework of fundamental concepts of basic sciences with emphasis on practical application in civil engineering.

5. Explain about different earth materials, their physical properties and their application in day to day use.

(A30560)INTRODUCTION TO ARTIFICIAL INTELLIGENCE
(Common to ECE, EEE, CIVIL, MECH)

B. Tech (CE)

L	T	P	C
3	0	0	0

Unit-I

Introduction: AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth-First, Depth-First Search, Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing, Generic Best-First, A*)

Unit-II

Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation, Minimax Search, Alpha-Beta Pruning.

Basic Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Forward Chaining and Backward Chaining.

Unit-III

Advanced Knowledge Representation and Reasoning: Knowledge Representation Issues, Nonmonotonic Reasoning, Other Knowledge Representation Schemes.

Unit-IV

Reasoning Under Uncertainty: Basic probability, Acting Under Uncertainty, Bayes' Rule, Representing Knowledge in an Uncertain Domain, Bayesian Networks.

Unit-V

Learning: What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Winston's Learning Program, Decision Trees.

TEXT BOOK: Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, Prentice Hall, 2010.

REFERENCE BOOKS:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill publications, Third Edition, 2009.

2. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.

Course Outcomes

After undergoing this course, the students will be able to:

1. Build intelligent agents for search and games
2. Solve AI problems through programming with Python
3. Learning optimization and inference algorithms for model learning
4. Design and develop programs for an agent to learn and act in a structured environment.

(A30015) SOFT SKILLS & PROFESSIONAL ETHICS

B.Tech (CE) V Semester

L	T	P	C
2	0	0	0

MODULE 1. Business Communication Skills

- English Language Enhancement
- The Art of Communication

OBJECTIVE

- The student will gain a functional understanding of basic English Grammar
- Practice language skills to eliminate errors in pronunciation and sentence construction
- Understand and enhance interpersonal communication process

MODULE 2. Intrapersonal & Interpersonal Relationship Skills

- Intrapersonal Relationships
- Interpersonal Relationships – To be an Effective Team Player

OBJECTIVE

- The student will understand the importance of and the various skills involved in developing enriching interpersonal relationships
- Be more aware of his/her own self – confidence, values
- Understand and handle emotions of self and others.
- Understand the necessity and importance of working together as a team
- Learn how to go about being a good team player and form an effective team
- Have put their team building skills to test in the various activities to understand where they stand and improve themselves with each succeeding activity.

MODULE 3. Campus to Company

- Corporate Dressing
- Corporate Grooming
- Business Etiquette
- Communication Media Etiquette

OBJECTIVE

- The student will understand what constitutes proper grooming and etiquette in a professional environment.
- Have some practical tips to handle him/her in a given professional setting.
- Have practiced the skills necessary to demonstrate a comfort level in executing the same.

MODULE 4. Group Discussions, Interviews and Presentations

- Group Discussions
- Interviews
- Presentations

OBJECTIVE

- The student will be able to appreciate the nuances of the Group Decision-making process.
- Understand the skills tested and participate effectively in Group Discussions.
- Learn the basics of how to make an effective presentation and have numerous practice presentations in small groups and larger audiences.
- Attend any type of interview with the confidence borne out of knowledge gained and practice sessions.

MODULE 5. Entrepreneurial Skills Development

- Goal Setting
- Entrepreneurial Skills – Awareness and Development
- **Objective**
- The student will be able to set specific measurable goals for themselves in their personal and/or professional life.
- Understand the skills and the intricacies involved in starting an entrepreneurial venture.
- **References**
- UNLEASH the power within….Soft Skills – Training Manual (Infosys Campus Connect)

(A30022) NCC/NSS

B.Tech (CE) V Semester

L	T	P	C
0	0	2	0

For NSS/ NSO Mandatory Courses and/or any other Mandatory Non-Credit Course offered in a semester, a 'Satisfactory Participation Certificate' shall be issued to the student from the authorities concerned, only after meeting the minimum attendance requirements in the Course. No Marks or Letter Grade shall be allotted for the Mandatory Courses.

(A30121) MINI PROJECT-I

B.Tech (CE) V Semester

L	T	P	C
0	0	0	0

Mini-Project-I will be taken up in the college or industry during the summer vacation after IV Semester examination. The Mini-Project-I will be evaluated during the V Semester. The Mini-Project-I will be submitted in the form of a report and should be presented before a committee, which shall be evaluated for satisfactory or Non-satisfactory. The committee consists of Head of the Department, the supervisor of Mini-Project-I, a senior faculty member of the department.

(A30122) INTERNSHIP-I

B.Tech (CE) V Semester

L	T	P	C
0	0	0	0

Internship-I will be taken up in the college or industry during the summer vacation after IV Semester examination. The Internship-I will be evaluated during the V Semester. The Internship-I will be submitted in the form of a report and should be presented before a committee, which shall be evaluated for satisfactory or Non-satisfactory. The committee consists of Head of the Department, the supervisor of Internship-I, a senior faculty member of the department.

VI SEMESTER

(A30123) DESIGN AND DRAWING OF STEEL STRUCTURES

B.Tech (CE) VI Semester

L	T	P	C
2	0	2	3

Course Objectives

- To help students understand the fundamental principles and procedures of Structural Steel design.
- To help students learn to apply the principles of Structural Steel design to real world problems.
- To prepare students for entry level structural engineering employment.

Unit - I

Materials - Making of iron and steel - Types of structural steel - mechanical properties of steel - Concepts of plasticity - yield strength, behaviour of steel, local buckling. Concept of limit State Design - Different Limit States as per IS 800 : 2007 - Design Strengths - deflection limits – serviceability- Loads and combinations of loads, wind loads on roof trusses.

Bolted connections - Design Strength of a joint in bearing, shear and direct tension –zig-zag and chain bolting- Efficiency of a bolted joint - Prying action-IS Code requirements- Gusset Plates- Design of bolted joints.

Welded Connections -Types of Welded joints- Advantages and disadvantages of welding- Strength of welds-Butt and fillet welds - Permissible stresses in welds - IS Code requirements. Design of welds.

Unit -II

General Design of members subjected to direct tension and bending – Lug Angles. Design of compression members - Buckling class - slenderness ratio- permissible stresses. Design of compression members (simple, built-up laced and battened columns) - column splice - column base - slab base.

Unit –III

Design of beams - Plastic moment - Bending and shear strength- design of laterally supported and unsupported beams - Built up sections - large plates- Web buckling and crippling - Deflection of Beams - Design of Purlins.

Unit -IV

Beam to beam and beam to Column connections.- Design of eccentric connections with and without brackets- fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints- - Web angle - Un-stiffened seated connections (bolted and Welded types)- Design of truss joints

Unit - V

Design of welded plate girders - optimum depth Design of main section - Design of end bearing stiffeners and intermediate stiffeners. Connection between web and flange- Curtailment of flange plates- Splicing- Design of web splices.

Text books:

1. Design of steel structures - N. Subramanian, Oxford University Press - 2009
2. Limit State Design of steel structures, S.K. Duggal, Tata McGraw- Hill,2010

Reference books:

1. Design of steel structures by K.S.Sai Ram, Person Education.
2. Design of Steel Structures Edwin H.Gaylord, Jr.Charles N.Gaylord and James Stallmeyer Tata McGraw-Hill Education pvt.Ltd.
3. Design of steel structures Vol. 1& 2 - Ramchandra, Standard Publications.

Course Outcomes:

1. Explain the concept of limit state method of design of steel structures, Material properties and types of steel and behaviour.
2. Design simple Bolted, Riveted and Welded Connections as well as eccentric and moment connections.
3. Design Tension and compression Members including splice connections and column bases.
4. Design laterally supported and unsupported beams, welded plate girders, splice connections.

Notes:

Students would be allowed to use the following standards and or codes of practice in the internal as well as the university examination.

1. IS 800 : 2007 Indian standard 'General Construction In Steel Code of Practice' (Third Revision)
2. IS:875 (Part 3) – 1987 Code of Practice For Design Loads (Other than Earthquake) For Buildings and Structures Part 3 Wind Loads
3. (Second Revision)
4. Steel Tables
5. Semester end examination would test the skill of the student on the design, detailing and drawing of structural steel members. To achieve this objective, semester end examination would have a compulsory section exclusively dedicated to design, detailing and drawing of one of the following steel members namely- beams, columns, truss members and Plate Girders. The questions in the other section would focus on the understanding of the principles and concepts, analysis and design oriented problems.

(A30124) FOUNDATION ENGINEERING

B.Tech (CE) VI Semester

L	T	P	C
3	0	0	3

Course Objectives

1. Understand and prepare bore logs for civil engineering projects.
2. Analyze the type of foundation suitability at a particular type of site.

Unit – I

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

Unit – II

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

Unit – III

Earth Pressure Theories: States of earth pressures-Active, Passive and at rest conditions, Rankine's theory-Computation of Active and Passive Earth Pressures in Cohesion less and Cohesive soils, Coloumb's wedge theory, Culmann's graphical method.

Retaining Walls: Types of retaining walls, stability of retaining walls against overturning, Sliding, bearing capacity and drainage from backfill.

Unit – IV

Shallow Foundations: Strength Criterion: Types, Choice of foundation, Location of depth, safe bearing capacity, Terzaghi and Meyerhof, Skempton and IS methods.

Shallow Foundations – settlement criteria – Safe bearing pressure

based on N value-Allowable bearing pressure: Safe bearing capacity-Allowable settlement of structures

Unit-V

Pile Foundation: Types of piles – Load carrying capacity of piles based on static pile formulae in different soils – Dynamic pile formulae – Pile load tests - Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

Well Foundations: Types – Different shapes of wells, Components of wells, functions and design Criteria, Sinking of wells, Tilts and shifts.

Text books:

1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New Age International Pvt. Ltd, (2004).
2. Soil Mechanics and Foundation Engineering. By V.N.S.Murthy, CBS Publishers and Distributors.
3. Bowles, J.E., (1988) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing company, Newyork.
4. Soil Mechanics and Foundation Engineering. By K.R. Arora, Standard Publishers and Distributors, Delhi

References:

1. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).
2. Das, B.M., - (1999) Principles of Foundation Engineering –6th edition (Indian edition) Thomson Engineering
3. Analysis and Design of Substructures – Swami Saran, Oxford and IBH Publishing company Pvt Ltd (1998).
4. Geotechnical Engineering by S. K.Gulhati & ManojDatta – Tata Mc. Graw Hill Publishing company New Delhi. 2005.
5. Soil Mechanics and Foundations by - by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
6. Foundation Engineering by Varghese, P.C., Prentice Hall of India., New Delhi.

Course outcomes:

1. Explain various methods of exploration of soil investigation

2. Apply the different methods of slope stability and earth pressure theories.
3. Explain plan and design of retaining wall.
4. Explain the strength and settlement criteria in shallow foundations
5. Explain and design pile and well foundations

(A30125) ESTIMATION AND COSTING

B.Tech (CE) VI Semester

L	T	P	C
3	0	0	3

Course Objectives:

- To prepare the detailed and abstract estimation of buildings using long wall short wall method and centre line method.
- To prepare the detailed and abstract estimation of earthwork for roads and canals.
- To calculate the rate analysis for different items of work in civil constructions.
- To prepare the bar bending schedules of reinforcement.
- To know the different types of contracts, contract documents and condition of contract.
- To prepare the bid analysis for a given sub trade and calculate the valuation of building.

Unit – I

General items of work in Building – Standard Unit Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating. Detailed Estimates of Buildings.

Unit – II

Earthwork for roads and canals.

Unit – III

Rate Analysis – Working out data for various items of work over head and contingent charges.

Unit – IV

Reinforcement bar bending and bar requirement schedules, Contracts, Types of contracts, Contract Documents, Conditions of Contract.

Unit – V

Valuation of buildings. Standard specifications for different items of building construction.

Text Books

1. Estimating and Costing by B.N. Dutta, UBBS Publishers, 2000.
2. Estimating and Costing by G.S. Birdie.

References

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 work – B.I.S)
3. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.
4. National Building Code.

Course outcomes:

1. Explain various types of estimates work stages and specification.
2. Estimate working out quantities for activities in roads and canals and schedules preparation.
3. Calculate rate analysis for various items of works in civil construction.
4. Explain types of contracts, tenders and to prepare valuation of buildings.

(A30126) WATER RESOURCES ENGINEERING

B.Tech (CE) VI Semester

L	T	P	C
3	0	0	3

Course objective

- In we are working in the field of irrigation Engineering. We should know how much water is going into the ground from where the plants can take their water also control the floods or avoid the lack of water for irrigation.
- The knowledge of hydrology is pre-requisite for the irrigation engineering and also for design of hydraulic structure. So one of the objectives of this course is to impart the knowledge of hydrology that deals with the occurrence, distribution, movement and properties of water on the earth.
- To impart the knowledge of various irrigation techniques, requirements of the crops.

Unit-I

Introduction to engineering hydrology and it's 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 – Evapotranspiration – 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 Hydrograph, definition, and limitations of applications of Unit hydrograph , derivation of Unit Hydrograph from Direct Runoff Hydrograph and 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 canal 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 formula, SCS curve number method, flood frequency analysis – Introductory part only. Stream Gauging – measurement and estimation of stream flow.

Text books:

1. Engineering Hydrology by Jayaram Reddy, Laxmi Publication Pvt. Ltd., New Delhi
2. Irrigation and water power engineering by Punmia & Lal, Laxmi publications Pvt. Ltd., New Delhi
3. Irrigation and Hydraulic structures by S.K. Grag.

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. Applied hydrology by Vent te chow, David R. Maidmentlarry W. Mays Tata MC. Graw Hill
5. Introduction to hydrology by Warren Viessvann, Jr. Garryl. Lewis, PHI

Course Outcomes

1. Explain various components of hydrologic cycle that affect the movement of water in the earth.
2. Explain the concepts of movement of ground water beneath the earth.
3. Explain the basic requirements of irrigation and various irrigation techniques, requirements of the crops.
4. Apply of math, science, and technology in the field of water resource Engineering.

(A30143) PRESTRESSED CONCRETE
(Professional Elective – II)

B.Tech (CE) VI Semester

L	T	P	C
3	0	0	3

Course objectives:

- To learn the concept, materials, methods and systems of prestressing
- To know the different types of losses and deflection of prestressed members
- To learn the design of prestressed concrete beams for flexural, shear and tension and to calculate ultimate flexural strength of beam
- To learn the design of anchorage zones, composite beams, analysis and design of continuous beam

UNIT - I

Introduction: Historic development- General Principles of prestressing pretensioning and post tensioning - Advantages and limitations of Prestressed concrete - General principles of PSC - Classification and types of prestressing Materials - high strength concrete and high tensile steel their characteristics.

Methods and Systems of prestressing: Pretensioning and Posttensioning methods and systems of prestressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford - Udall System - Lee McCall system.

UNIT – II

Losses of Prestress: Loss of prestress in pretension and post-tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage, frictional losses.

UNIT -III

Flexure: Analysis of sections for flexure- beams Prestressed with straight, concentric , eccentric, bent and parabolic tendons - stress diagrams- Elastic design of PSC beams of rectangular and I sections -

Kern line - Cable profile and cable layout.

Shear: General considerations - Principal tension and compression - Improving shear resistance of concrete by horizontal and vertical prestressing and by using inclined or parabolic cables- Analysis of rectangular and I beams for shear - Design of shear reinforcements - Bureau of Indian Standards (BIS) Code provisions.

UNIT - IV

Transfer of Prestress in Pretensioned Members: Transmission of prestressing force by bond - Transmission length - Flexural bond stresses - IS code provisions - Anchorage zone stresses inpost tensioned members - stress distribution in End block - Analysis by Guyon, Magnel, Zielinski and Rowe's Methods - Anchorage zone reinforcement - BIS Provisions.

UNIT - V

Composite Beams: Different Types - Propped and Unpropped - stress distribution - Differential shrinkage - Analysis of composite beams - General design considerations.

Deflections: Importance of control of deflections - Factors influencing deflections - Short term deflections of uncracked beams - prediction of longtime deflections - BIS code requirements.

TEXT BOOK:

1. Prestressed concrete by N.Krishna Raju, 5th Edition, Tata McGraw Hill Book Education Pvt.Ltd.

REFERENCES:

1. Design of prestress concrete structures by T.Y.Lin and Burn, Jhon Wiley, New York.
2. Prestressed concrete by S.Ramamrutham, Dhanpat Rai & Sons, Delhi.
3. Prestressed Concrete by N.Rajagopalan, Narosa Publishing House.

Course Outcomes:

On completion of the course, the students will**:**

- Be able to explain with the prestressed concrete mechanism, fabrication and construction process
- Be able to analyze prestressed concrete members
- Be able to design a prestressed concrete beam accounting for losses

(A30144) DESIGN OF BRIDGE STRUCTURES
(Professional Elective - II)

B.Tech (CE) -VI Semester

L	T	P	C
3	0	0	3

Course Objectives

- Types of bridges, types of loadings acting on bridges, forces and stresses on bridges.
- Method of analysis and Design of Solid slab Bridges.
- Method of Analysis and Design of Girder Bridges and Courbon's and Grillage analogy.
- Design of Pre-stressed concrete Bridges.
- Design and analysis of Bridge Decks and design loads for piers and Abutments.

Unit- I

Introduction: History of Bridges - Components of a Bridge and its definitions- Classification of Road Bridges - Selection of Site and Initial Decision Process - Survey and Alignment; Geotechnical Investigations and Interpretations. River Bridge: Selection of Bridge site and planning - Collection of Bridge design data - Hydrological calculation Road Bridges - IRC codes - Standard Loading for Bridge Design - Influence lines for statically determinate structures - I.L. for statically indeterminate structures - Transverse distribution of Live loads among deck longitudinal - Load combinations for different working state and limit state designs Railway Bridges: Loadings for Railway Bridges; Railroad data. Pre-design considerations; - Railroad vs. Highway bridges.

Unit- II

Super Structures Selection of main bridge parameters, design methodologies -Choices of superstructure types; Orthotropic plate theory, load + techniques - Grillage analysis - Different types of superstructure (RCC and PSC); Longitudinal Analysis of Bridge.- Transverse Analysis of Bridge- Temperature Analysis-

Unit -III

Design of Steel Bridges - Design of Plate girder bridges.

Unit -IV

Design of RC Bridges -Design of slab bridges – Girder bridges

Unit- V

Substructure, Bearings and Deck Joints, Parapets and Railings Substructure - Pier; Abutment - Wing walls- Importance of Soil-Structure Interaction - Types of foundations - Open foundation- Pile foundation- Well foundation- - Bearings and Deck Joints - Different types of bridge bearings and expansion joints - Parapets and Railings for Highway Bridges

Textbooks

1. Johnson Victor D., "Essentials of Bridge Engineering", Oxford and IBH Publishing Co., New Delhi, 1990.
2. Jagadeesh .T.R. and Jayaram.M.A., "Design of Bridge Structures", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2013
3. Design of Bridges by Krishna Raju, Oxford & IBH Publishers.

References

1. Phatak D.R., "Bridge Engineering", Satya Prakashan, New Delhi, 1990.
2. Ponnuswamy S., "Bridge Engineering", Tata McGraw-Hill, New Delhi, 1996.
3. Rajagopalan. N. "Bridge Superstructure", Alpha Science International, 2006

Course Outcomes:

1. Explain different types of Bridges, economic span length, General Design Requirements.
2. Explain the Method of Analysis of Solid Slab Bridges.
3. Explain the Method and Analysis of Girder bridges and Understanding Courbon's Theory and Grillage Analogy.
4. Explain basic Principles required for Prestressed. Concrete bridges and Understanding General Requirements of Road Bridges.

5. Explain harmonic analysis and Grillage analogy for analysis of bridge Decks and also understanding about the design of Piers and Abutments.

Notes:

Limit state design is not yet adopted in text books dealing with the Road Bridges. Hence students shall be allowed to follow working stress design till the time we have a good number of text books using Limit State Design for Bridges.
Students would be allowed to use the following handbooks and or codes of practice in the internal as well as the university examination.

1. IRC : "6-2000 Standard Specifications and Code of Practice for Road Bridges, Section : Ii Loads and Stresses" (Fourth Revision)
2. IRC: 21 –2000 "Standard specification and code of practice for road bridges (Plain and Reinforced)" Indian road congress, New Delhi, India, 2000.
3. IRC: 18 –2000 "Standard specification and code of practice for road bridges (Plain and Reinforced)" Indian road congress, New Delhi, India.
4. IRC: 21 –2000 "Code of Practice for Concrete Road Bridges" Indian road congress, New Delhi, India, 2011.
5. IRC 112 - 2011 : "Code of Practice for Concrete Road Bridges"
6. Pigeaud's Curves for Design of Slab Bridges

(A30145) ELEMENT S OF EARTHQUAKE ENGINEERING
(Professional Elective – II)

B.Tech (CE) VI Semester

L	T	P	C
3	0	0	3

Course Objectives:

The students will come to know regarding these topics

- Plate tectonic theory, seismic waves and earthquake measurements instruments
- Earthquake resistant design of buildings
- Determine the horizontal seismic coefficient, design seismic base shear and distribution of design force.
- Seismic methods of analysis and design
- Structural walls and non structural elements.
- Ductility considerations in earthquake resistant design

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- Seismograph, accelerograph-strong ground motions- Seismic Zones of India.

Theory of Vibrations: Elements of vibratory systems-Degrees of Freedom-Continuous system- Lumped mass idealization –Oscillatory motion-Simple Harmonic Motion- Free vibration of single degree of freedom (SDOF) system –undamped and damped –critical damping-Logarithmic decrement-Forced vibrations-Harmonic excitation-Dynamic magnification factor-Excitation by rigid based translation for SDOF system-Earthquake ground motion.

Unit-II

Conceptual Design: Introduction- Functional planning-Continuous load path- Overall form-simplicity and strength-Horizontal and Vertical members-Twisting of building-Ductility- definition- ductility relationships- flexible buildings-framing systems-choice of construction materials- Unconfined concrete-confined concrete-masonry-reinforcing steel.

Introduction to earthquake resistant design: Seismic design

requirements- regular and irregular configurations-basic assumptions-design earthquake loads-basic load combinations- permissible stresses- seismic methods of analysis-factors in seismic analysis-equivalent lateral force method.

Unit-III

Reinforced Concrete Buildings: Principles of earthquake resistant design of RC members-Structural models of frame buildings-Seismic methods of analysis- Seismic design methods- IS code based methods for seismic design-Seismic evaluation and retrofitting-Vertical irregularities-Plan configuration problems –lateral load resisting systems-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-Behaviour of unreinforced and reinforced masonry walls- Behaviour of walls-Box action and bands –Behaviour of infill walls-Improving seismic behaviour of masonry buildings-Load combinations and permissible stresses-Seismic design requirements –Lateral load analysis of masonry buildings.

Unit-V

Structural Walls and Non- Structural walls- sectional walls-sectional shapes-variations in elevation-cantilever walls without openings- failure mechanism of non- structures- Effects of non-structural elements on structural systems-Analysis of non-structural elements-Prevention of non-structural damage- Isolation of non-structures. Ductility Considerations in Earthquake Resistant design of RC buildings: Introduction –Impact of Ductility-Requirements for Ductility-Assessment of Ductility-Factors affecting Ductility- Ductile detailing considerations as per IS 13920. Behavior of beams, columns and joints in RC buildings during earthquakes- Vulnerability of open ground storey 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.

References:

1. Sesmic Design of Reinforced Concrete and Masonry Bilding- T. Paulay and M.J.N. Priestly,John Wiley &Sons.
2. Earthquake Resistant Design of Building structures by Vinod Hosur, Wiley India Pvt.Ltd.
3. Elements of Mechanical Vibration by R.N. Iyengar, I.K. International Publishing House Pvt. Ltd
4. Masonry and Timber structures including earthquake Resistant Design –Anand S. Arya, Nemchand & Bros.
5. Earthquake Tips- Learning Earthquake Design and Construction. C.V.R. Murthy.

Course Outcomes:

1. Evaluate seismic forces for various structures as per relevant Indian standards ·
2. Design and detail of structures for seismic resistance as per Indian Standards ·
3. Apply concepts of repair and rehabilitation of earthquake affected structures.

(A30003) ADVANCED ENGLISH COMMUNICATION SKILLS LAB

B.Tech (CE) VI Semester	L	T	P	C
	0	0	3	1.5

Introduction

The introduction of the English Language Lab is considered essential at 3rd year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

Course Objectives

This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.

Syllabus

The following course content is prescribed for the Advanced Communication Skills Lab:

1. **Functional English**
   Starting a conversation, responding appropriately and relevantly, using the right body language, Role play in Different Situations.

2. **Vocabulary building**
   Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, analogy, idioms and phrasal verbs.

3. **Group Discussion**
   Dynamics of group discussion, intervention, summarizing,

modulation of voice, body language, relevance, fluency and coherence.

4. **Interview Skills** –
   Concept and process, pre-interview planning, opening strategies, answering strategies, Interview through tele and video-conferencing.

5. **Resume` and Technical Report writing**
   Structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets, summary, formats and styles, Letter-writing.
   Reading comprehension – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning and critical reading.

Minimum Requirement:
The English Language Lab shall have:

- The Computer aided Language Lab for 60 students with 60 systems,
- One master console, LAN facility and English language software for self- study by learners.
- The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.
- System Requirement (Hardware component):
- Computer network with Lan with minimum 60 multimedia systems with the following specifications:
  P – IV Processor
  d) Speed – 2.8 GHZ
  e) RAM – 512 MB Minimum
  f) Hard Disk – 80 GB
  Headphones of High quality

Suggested Software:
The software consisting of the prescribed topics elaborated above should be procured and used.

- Clarity Pronunciation Power – part II

- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech
- TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

The following software from 'train2success.com'

Preparing for being Interviewed, Positive Thinking, Interviewing Skills, Telephone Skills, Time Management, Team Building, Decision making

Distribution and Weightage of Marks: English Language Laboratory Practical Examination:

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.

2. For the Language lab sessions, there shall be a continuous evaluation during the year for **40** sessional marks and **60** year-end Examination marks. Of the **40** marks, **20** marks shall be awarded for day-to-day work and **20** marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

Course Outcomes

1. Organise ideas relevantly and coherently.
2. Engage in debates.
3. Discuss in a group.
4. Face interviews.
5. Write project/research reports/technical reports.
6. Make oral presentations.
7. Write formal letters.
8. Transfer information from non-verbal to verbal texts and vice versa.
9. To take part in social and professional communication.

(A30127) GEOTECHNICAL ENGINEERING LAB

B.Tech (CE) VI Semester	L	T	P	C
	0	0	3	1.5

Course Objectives:

- To impart knowledge of determination of index properties required for classification of soils.
- To teach how to determine compaction characteristics and consolidation behavior from relevant lab tests; to determine permeability of soils.
- To teach how to determine shear parameters of soil through different laboratory tests.

List of Experiments

1. Water content and Specific gravity
2. Atterberg's Limits (LL & PL)
3. Field density-core and sand replacement method
4. Grain size analysis
5. Permeability of soil, constant and variable head test
6. Compaction Test
7. CBR Test
8. Consolidation Test
9. Unconfined Test
10. Tri-axial Compression test
11. Direct shear test
12. Vane shear test

References:

1. BIS codes for soil testing and ASTM codes of practice
2. Lambe, T.W., "Soil Testing for Engineers", Wiley Eastern Ltd., New Delhi, 1969.

3. Engineering Properties of Soil and their Measurements – Bowels J.E (1988), McGraw Hill Book Co. New York.

Course Outcomes:

1. Determine index properties of soil and classify them.
2. Determine permeability of soils.
3. Determine Compaction, Consolidation and shear strength characteristics.

(A30128) TECHNICAL SEMINAR-I

B.Tech (CE) VI Semester	L	T	P	C
	2	0	0	2

- For the Technical Seminar-I, the student shall collect the information on a specialized topic related to the student branch other than Mini projects-I & II/ Internships-I & II/ Major Projects Phase-I & II topic with due approval of the Head of the department and prepare a technical report and submit to the department.

- The presentation demonstrating understanding of the topic and technical report will be evaluated by a Departmental committee consisting of the Head of the department, Technical Seminar-I supervisor and a senior faculty member from the department.

- The Technical seminar will be evaluated for 100 marks.

- There will be no SEE or external examination for the Technical Seminar-I.

(A30556)CYBER SECURITY
(Common to all branches)

B. Tech (CE)

L	T	P	C
3	0	0	0

Unit-I

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIATriad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

Unit-II

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

Unit-III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

Unit-IV

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security

and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

Unit-V

Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.

TEXT BOOKS:

1. Nina Godbole and SunitBelpure, Cyber Security Understanding Cyber Crimes, ComputerForensics and Legal Perspectives, Wiley
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles,Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

REFERENCES:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.

Course Outcomes

After completion of this course, the students shall be able to:

1. Understand, appreciate, employ, design and implement appropriate security technologies
2. and policies to protect computers and digital information.
3. Identify & Evaluate Information Security threats and vulnerabilities in Information
4. Systems and apply security measures to real time scenarios
2. Identify common trade-offs and compromises that are made in the design and development process of Information Systems
3. Demonstrate the use of standards and cyber laws to enhance information security in the development process and infrastructure protection

(A30017) INDIAN CONSTITUTION
Constitution of India – Basic features and fundamental principles

B.Tech (CE) VI Semester	L	T	P	C
	2	0	0	0

UNIT-I:

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India

UNIT-II:

4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation

UNIT-III:

7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure

UNIT-IV:

10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions : National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India

UNIT-V:

13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

Course Outcomes of Constitution of India- basic features and Fundamental Principles

1. Gain Knowledge about the history and the salient features of our constitution
2. Become aware of the Fundamental rights, Fundamental duties and the Directive principles of state policy
3. Become acquainted with the distribution of powers between the central and the state governments
4. Gain awareness of the Constitutional amendments, Emergency provisions and Local self-Government
5. Become responsible citizens of the country

(A30018) ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

B.Tech (CE) VI Semester	**L**	**T**	**P**	**C**
	2	0	0	0

UNIT-I:

1. Basic structure of Indian knowledge system

UNIT-II:

2. Modern science and Indian knowledge system
3. Yoga and Holistic Health care

UNIT-III:

4. Philosophical Tradition
5. Indian artistic Tradition

UNIT-IV:

6. Indian Linguistic tradition (Phonology, morphology, syntax and semantics)

UNIT-V:

7. Case studies

Course outcomes:

At the end of the course the students will be able to

1. Compare and contrast the basics of Indian traditional knowledge with modern scientific perspective.
2. Analyse the structure of Indian knowledge system.
3. Defend the Indian artistic tradition against the modern convergence of change.
4. Recognise the importance of Yoga and holistic health care.
5. Predict the outcomes of their research/case studies.

VII SEMESTER

(A30146) IRRIGATION DESIGN AND DRAWING
(Professional Elective-III)

B.Tech (CE) VII Semester	L	T	P	C
	3	0	0	3

Course Objectives:

1. To know the importance, location, components and types of irrigation structures.
2. To design various irrigation structures.
3. To get experience in drawing of irrigation structures.

GROUP A

1. Surplus Weir.
2. Syphon Well Drop
3. Trapezoidal notch fall
4. Tank sluice with tower head

GROUP B

1. Sloping glacis weir
2. Canal regulator
3. Under Tunnel
4. Type III Syphon aqueduct

Final Examination Pattern:

- The question paper is divided into two parts with two parts with two questions in each part.
- The student has to answer ONE question from each part. .Part I should cover the designs and
- Drawing from Group A for 45 marks and part II should cover only designs from Group B carrying 30 marks.
- The duration of the examination will be Three hours.
- However, the students are supposed to practice the drawing for Group B structures also for internal evaluation.

Text books:

1. Water Resources Engineering – Principles and Practice by Challa Satyanarayana Murthy, New Age International Publishers.

2. Irrigation Engineering and Hydraulic structures by S.K. Garg, Standard Book House.

Course Outcomes:

1. Design and detail of various irrigation structures like Surplus Weir, Syphon Well Drop, Trapezoidal notch fall and Tank sluice with tower head
2. Design and detail of various irrigation structures like Sloping glacis weir, Canal regulator, Under Tunnel and Type III Syphon aqueduct

(A30147) IRRIGATION AND HYDRAULICS STRUCTURES
(Professional Electives – III)

B.Tech (CE) -VII Semester

L	T	P	C
3	0	0	3

Course Objectives

- Understand fundamentals of design in water resources engineering.
- To introduce the structure of the dams, earth dam, canals, spillways and cross drainage works.
- To learn how to estimate the capacity of reservoir using mass curve.
- Able to classifying the types of water fall from the canals.
- Necessity and importance of diversion, storage head works, weir and barrages and to divert the cross drainage works.

Unit - I

Storage Works: Reservoirs – Types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, estimation of capacity of reservoir using mass curve – Reservoir Sedimentation – Life of Reservoir. Types of dams, factors affecting selection of type of dam.

Unit - II

Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a low gravity dam, Factors of safety – stability analysis, Foundation for a Gravity Dam, drainage and inspection galleries.

Unit- III

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

Spill ways: types of spillway, Design principles of Ogee spillways – spillway gates. Energy Dissipaters and stilling basins significance of Jump Height Curve and tail water Rating curve – USBR and Indian types of stilling Basins.

Unit – IV

Diversion Head works: Types of Diversion head works – weirs and barrages, layout of diversion head work – components. Causes and failure of weirs and Barrages on permeable foundations – silt Ejectors and silt Excluders

Weirs on permeable Foundations – Creep Theories – Bligh's Lane's and Khosla's theories, Determination of uplift pressure – various Correction Factors – Design principals of weirs on permeable foundations using Creep theories – exit gradient, U/S and D/S 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, principles of design of distributory and head regulators, Canal Cross Regulators – Canal outlets, types of canal modules, proportionality, sensitivity and flexibility.

Cross Drainage works: Types, selection of site, Design principles of aqueduct, siphon aqueduct and super passage.

Text Books

1. Irrigation engineering and hydraulic structures by S.K. Garg, Khanna publications Pvt. Ltd., New Delhi
2. Irrigation and water power engineering by Punmia & Lal, Laxmi publications Pvt. Ltd., New Delhi

References:

1. Irrigation and resources engineering by G.L.Asawa, New Age International publishers
2. Theory and Design of Hydraulic structures by Varshney, Gupta & Gupta
3. Irrigation engineering by K.R. Arora
4. Irrigation Engineering by R.K. Sharma and T.K. Sharma, S. Chand publishers
5. Introduction to hydrology by Warren Viessvann, Jr. Gary. Lewis, PHI
6. Engineering Hydrology by CS Pojha, R. Berndtsson and P. Bhunya, Oxford University press

Course Outcomes:

1. Explain water resources importance, occurrence, forms and availability
2. Explain development and management of water resources
3. Explain different forms, water availability and its exploration methods for different uses
4. Explain storage and conservation of water by planning and constructing different types of dams, canals etc

(A30148) WATERSHED MANAGEMENT
(Professional Electives – III)

B.Tech (CE) VII Semester	**L**	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

1. Introduce the concept of watershed management and Understand the watershed characteristics
2. Learn the principles of soil erosion, measures to control erosion and various water harvesting techniques.
3. Learn land management practices for various land use/land cover.
4. Introduce concepts of watershed modeling.

UNIT I

INTRODUCTION: Concept of watershed development, objectives of watershed development, need for watershed development in India, Integrated and multi-disciplinary approach for watershed management. CHARACTERISTICS OF WATERSHED: Size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watersheds.

UNIT II

PRINCIPLES OF EROSION: Types of erosion, factors affecting erosion, effects of erosion on land fertility and land capability, estimation of soil loss due to erosion, Universal soil loss equation. MEASURES TO CONTROL EROSION: Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, rockfill dams, brushwood dam, Gabion.

UNIT III

PLANNING OF WATERSHED MANAGEMENT ACTIVITIES: peoples participation, preparation of action plan, administrative requirements. 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.

UNIT V

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.

TEXT BOOK

1. Watershed Management' by Das MM and M.D Saikia, PHI Learning Pvt. Ltd, 2013.
2. Land and Water Management' by Murthy.VVN, Kalyani Publications, 2007.
3. Watershed Management' by Murthy J V S, New Age International Publishers, 2006.

REFERENCE BOOKS:

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:

1. Calculate watershed parameters and analyse watershed characteristics to take appropriate management action.
2. Quantify soil erosion and design control measures.
3. Apply land grading techniques for proper land management and Suggest suitable harvesting techniques for better watershed management.
4. Apply appropriate models for watershed management.

(A30149) ADVANCED STRUCTURAL DESIGN
(Professional Elective – IV)

B.Tech (CE) VII Semester	L	T	P	C
	3	0	0	3

Course Objectives:

- To develop the necessary theoretical understanding of complex structural response
- To analyze and evaluate systems in structural engineering using force and displacement methods of various structures (plane trusses, plane frames, continuous beams and grids)
- To deal with matrix analysis of structures by forming an excellent mathematical framework
- To analyse structural behaviour with and without shear wall.

Unit-I

Design and detailing of cantilever and counterfort retaining walls- stability Checks

Unit-II

Working stress design of water tanks- Circular and Rectangular Water tanks resting on ground as well as elevated above ground- Design of Intze tank- Design of staging for elevated water tanks.

Unit-III

Design of Cinema Balcony, Flat slabs (Interior Panels only)-

Unit-IV

Working Stress Design of Concrete Bridges- IRC loading, Design of Slab Bridge using Pigeaud's Curves, Design of T- beam Girder Bridge.

Unit-V

Design of RCC Chimneys, Bunkers& Silos

Text Books

1. Advanced reinforced Concrete Structures by Varghese, Pranties Hall of India Pvt.Ltd.
2. Bridge Engineering By S.Ponnuswamy. Mc Graw Hill Co
3. Reinforced Concrete Design by S.A. Pillai and D.Menon, Tata McGraw Hill Publishing Company.

4. Advanced reinforced Concrete Structures by Krishna Raju
5. Advanced R.C.C. Design by S.S. Bhavikatti
6. Design of Bridges by Krishna Raju, Oxford & IBH Publishers.

References:

1. Reinforced Concrete Structures Vol. 2 by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, Publications Pvt.Ltd. New Delhi
2. Essentials of Bridge Engineering By D.John Son Victor, Oxford and IBM Publication Co. Pvt. Ltd

Course Outcomes:

On successful completion of the course students will be able to:

1. Explain the terminology and topics of higher level theory of structures at a professional level.
2. Explain the matrix analysis of structures.
3. Apply theory to analyse various structures (plane trusses, plane frames, continuous beams and grids)

Notes:

Limit state design is not yet adopted in text books dealing with the design of Liquid Retaining Structures and Road Bridges. Hence students shall be allowed to follow working stress design till the time we have a good number of text books using Limit State Design for these topics.

Students would be allowed to use the following handbooks and or codes of practice in the internal as well as the university examination.

1. IS 456:2000 Indian standard 'Plain and Reinforced Concrete - Code of Practice' (Fourth Revision)
2. IS : 3370 (Part 1 to 4) – 1965 (Reaffirmed 1999) Indian Standard 'Code of Practice for Concrete Structures for the Storage of Liquids'
3. IS : 4995 (Part II) – 1974 Indian Standard 'Criteria for Design of Reinforced Concrete Bins for Storage Of Granular and Powdery Materials'

4. IRC : '6-2000 Standard Specifications and Code of Practice for Road Bridges, Section : II Loads and Stresses' (Fourth Revision)
5. IRC: 21 –2000 "Standard specification and code of practice for road bridges (Plain and Reinforced)" Indian road congress, New Delhi, India, 2000.
6. IRC: 18 –2000 "Standard specification and code of practice for road bridges (Plain and Reinforced)" Indian road congress, New Delhi, India.
7. IRC: 21 –2000 "Code of Practice for Concrete Road Bridges" Indian road congress, New Delhi, India, 2011.
8. Pigeaud's Curves for Design of Slab Bridges

(A30150) FINITE ELEMENT METHODS IN CIVIL ENGINEERING
(Professional Elective –IV)

B.Tech (CE) VII Semester	L	T	P	C
	3	0	0	3

Course Objectives:

- To study the concept of FEM
- To study the strain –displacement and linear constitutive relation
- To understand the numerical techniques applied in FEM
- To Establish element stiffness and load vector
- To study about the 2-D isoparametric concepts
- To analyze the 2-D frame elements using FEM techniques
- To apply FEM for analysing plates and shells

Unit – I

Introduction to Finite Element Method – Basic steps involved in Finite element methods- Advantages and Disadvantages of FEM, Finite Difference Method- Rayleigh Ritz Method and application to solve simple bar elements and single span beams - Force and Displacement boundary Conditions, Natural boundary conditions, Essential and Non essential boundary conditions- Initial value problem- Boundary value problem –Body Force and Surface tractions (forces) - Basic Equations in Elasticity – stress strain equations – Generalized Hooke's law- concept of plane stress – plane strain – advantages and disadvantages of FEM. Element shapes – nodes – nodal degree of freedom – strain displacement relations.

Unit – II

Local and Global coordinate system- Natural Coordinates- Simple Natural Coordinates- Area and Volume coordinates, Convergence and Compatibility Conditions for Shape functions, Geometric Invariance- Pascal Triangle- Shape functions- Transformation of coordinate system- Strain displacement matrix- generation of element stiffness matrix - Lumped and Consistent load vector- Application of boundary conditions

Finite Element Analysis (FEA) of – one dimensional problems – Bar element – Shape functions- stiffness matrix.

FEA Beam elements – stress strain relation – shape functions- stiffness matrix – continuous beams up to 2(two) spans.

Unit - III

FEA of Two dimensional problem – CST &LST and 4 noded quadrilateral element – shape functions- Lagrangian & Serendipity elements – Hermite polynomials- Lagrange Polynomials –stress strain relationship- Element Degenaration- Static Condensation

Unit – IV

Isoparametric formulation – Concepts of isoparametric elements for 2D analysis – formulation of CST element, 4-noded and 8-nodediso-parametric quadrilateral elements- Jacobi matrix

Unit – V

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

Text books:

1. Introduction to Finite elements in engineering by Chandrupatla, Belegundu, Prentice Hall.
2. Finite element method by Daryl L.Logan, CENGAGE Learning.

References:

1. Finite element analysis by S.S. Bhavikatti – New age International publishers.
2. Finite element analysis by P. Seshu, PHI.

Course Outcomes:

On completion of the course, the students will be able to:

1. Demonstrate the differential equilibrium equations and their relationship
2. Apply numerical methods to FEM
3. Develop the displacement models and load vectors
4. Compute the stiffness matrix for isoperimetric elements
5. Analyze plane stress and plane strain problems

(A30151) CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT
(Professional Elective-IV)

B.Tech (CE) -VII Semester

L	T	P	C
3	0	0	3

Course Objectives:

The objective of this course is:

- To introduce to the student the concept of project management including network drawing and monitoring.
- To introduce the various equipment related to construction like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery.
- To introduce the importance of safety in construction projects.

Unit-I

Management process- Roles, management theories, Social responsibilities, planning and strategic management, strategic implementation, Decision making tools and techniques-Organizational structure, Human resource management- motivation performance- leadership.

Unit-II

Classification of construction projects, Construction Stages, Resources-Functions of Construction Management and its Applications, Preliminary planning –Collection of Data-Contract planning –Scientific Methods of Management; Network Techniques in construction management- Bar Chart-Grant Chart, CPM- PERT-Cost & Time optimization .

Unit-III

Resource planning – planning for manpower, materials, Cost, equipment, Labour, Scheduling, Forms of, Scheduling-Resource allocation, budget and budgetary control methods.

Unit-IV

Contract-types of contract, contract document, specification, important conditions of contract- tender and tender document- Deposits by contractor

–Arbitration, negotiation – M- Book –Muster rolls- stores

Unit-V

Management information systems- Labour Regulations: Social security-welfare Legislation-laws relating to wages , Bonus and industrial disputes, Labour administration – insurance and safety Regulations- Workmen's compensation Act – other labour laws- safety in construction : legal and financial aspects of accidents in construction , occupational and safety hazard assessment , human factors in safety , legal and financial aspects of accidents , occupational and safety hazard assessment.

Text Books

1) Ghalot, P.S., Dhir, D.M., Construction planning and Management, Wiley Eastern limited,1992
2) Chikara, K.K., Construction Project Management, Tata McGraw Hill publishing Co, Ltd New Delhi,1998
3) Punima, B.C., Project planning and Control with PERT and CPM, Laxmi Publications New Delhi 1987

Reference:

1. Construction Management and Planning by Sengupta, B. Guha, H., Tata McGraw Hill Publications

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Explain the importance of construction planning and functioning of various earth moving equipment.
2. Explain production of aggregate products and concreting.
3. Apply the gained knowledge to project management and construction techniques.

(A30152) URBAN TRANSPOTATION PLANNING

Professional Elective -V

B.Tech (CE) VII Semester	**L**	**T**	**P**	**C**
	3	0	0	3

UNIT-I:

Urban Transportation Problem Travel Demand: Urban Issues, Travel Characteristics, Evolution of Planning Process, Supply and Demand – Systems approach. Travel Demand: Trends, Overall Planning process, Long term Vs Short term planning, Demand Function, Independent Variables, Travel Attributes, Assumptions in Demand Estimation, Sequential, and Simultaneous Approaches, Aggregate and Disaggregate Techniques.

UNIT-II:

Data Collection And Inventories: Collection of data – Organisation of surveys and Analysis, Study Area, Zoning, Types and Sources of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data – Income – Population – Employment – Vehicle Owner Ship.

UNIT-III:

Trip Generation and Distribution : UTPS Approach, Trip Generation Analysis: Zonal Models, Category Analysis, Household Models, Trip Attraction models, Commercial Trip Rates. Trip Distribution: Growth Factor Methods, Gravity Models, Opportunity Models, Time Function Iteration Models. By- pass Trips.

UNIT-IV:

Mode Choice and Traffic Assignment: Mode Choice Behaviour, Competing Modes, Mode Split Curves, Models and Probabilistic Approaches. Traffic Assignment: Basic Elements of Transport Networks, Coding, Route Properties, Path Building Criteria, Skimming Tree, All-or-

Nothing Assignment, Capacity Restraint Techniques, Reallocation of Assigned Volumes, Equilibrium Assignment, Diversion Curves.

UNIT-V:

Plan Preparation and Evaluation: Travel Forecasts to Evaluate Alternative Improvements, Impacts of New Development on Transportation Facilities. Master plans, Selection of Corridor, Corridor Identification, Corridor deficiency Analysis, Economic Impacts of Transportation.

TEXT BOOKS

1. Introduction to Urban System Planning' by Hutchinson, B.G., McGraw Hill.
2. Transportation Engineering - An Introduction' by Khisty C.J., Prentice Hall.
3. Fundamentals of Transportation Planning' by Papacostas, Tata McGraw Hill.

REFERENCES:

1. Introduction to Transportation Planning – M.J.Bruton; Hutchinson of London Ltd.

2. Introduction to Urban System Planning - B.G.Hutchinson; Mc Graw Hill.
3. Traffic Engineering and Transport Planning - Kadiyali L.R., Khanna Publishers
4. Lecture notes on UTP - Prof. S. Raghavachari , R.E.C.Warangal. M.TECH. (HIGHWAY ENGINEERING)-R13 Regulations

Course Outcomes:

- Identify urban transportation problems and Estimate urban travel demand.
- Plan urban transport networks
- Identify urban transport corridors
- Prepare urban transportation plans

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(A30153) PAVEMENT MATERIAL CHARACTERIZATION
(Professional Elective-V)

B.Tech (CE) VII Semester	L	T	P	C
	3	0	0	3

Course Objectives

- Understand various tests on subgrade soil, aggregates, bitumen and cement
- Learn bituminous mix and cement concrete mix designs
- Learn basic principles of superpave technology of bituminous mixes

UNIT -I

Soil and Aggregate: Soil-Classification methods, Tests: CBR, Consistency, Engineering Properties and Modulus of sub-grade reaction of soil, selection of suitable filter for soils, Triaxial method. Aggregate Origin, Classification, requirements, properties and tests on road aggregates for flexible and rigid pavements. Blending of aggregates, Importance of aggregate shape factor in mix design.

UNIT-II

Methods of Test for Stabilized Soils: Method of sampling and Preparation of Stabilized Soils for Testing, Relation for Moisture content and Dry Density of Stabilized mixes, wetting. Drying, Thawing & freezing tests for compacted soil cement mix, UCS of Stabilized soil, test for: soil bituminous, soil lime and soil fly ash mixes.

UNIT-III

Bitumen, Tar and Bituminous Mix Design; Origin, preparation, properties, requirements, criteria for selection of different binders, Temperature susceptibility, Bitumen test data chart, Stiffness modulus, VanderPoel Nomo graph. Bituminous emulsion and Cutbacks, fillers, extenders, polymers, Crum rubber, and rubber modified bitumen and anti-Stripping agents on pavement performance. Bituminous mix design, binder content, gradation, Engineering properties : Dynamic conditions, Quasi static conditions, Fracture and Fatigue; Marshal stability, Haveem stability test;

example problem, static creep test, repeated load test, Resilient & dynamic modulus test, empirical test, simulation test, flexural test, diametric repeated load test, splitting tension test, permanent deformation Parameters And other properties, Effects use of Geo Synthetics.

UNIT - IV

Introduction to Super pave Technology: Methods of selection of suitable ingredients for super pave method, Gyratory compaction, rolling thin film oven, pressure aging vessel, rotational viscometer, dynamic shear rheometer, bending beam rheometer, direct tension test. Use of super pave perform and grade binder specifications. Comparison between Marshal Mix method and Super pave method. Cement concrete Mixes: Requirements of paving concrete, mix design, Admixtures, Tests on cement Concrete. Recycling bituminous material, fundamental of recycling bituminous material, hot and cold recycling of bituminous material, methods of recycling, equipment use, sites specific material specifications, Design of mixes for recycling of bituminous and concrete pavement surface.

UNIT – V

Cement concrete mixes and recycling bituminous material; cement concrete Mixes: Requirements of paving concrete, mix design, admixtures, and tests on cement concrete. Recycling bituminous material, fundamental of recycling of recycling bituminous material, methods of recycling, equipment use, sites specifications, Design of mixes for Recycling of bituminous and concrete pavement surface.

Course Outcomes

- Enable characterization of soils based on index and engineering properties
- Understand subgrade soil strength in terms of standard engineering parameters
- Application of basic principles of mix design of cement concrete and bituminous mixes

Suggested Reading

1. Highway Engineering,-Paul H. Wright,. Karen K. Dixon, John

Wiley & Sons, 7th edition,2004.
2. Principles and Practices of Highway Engineering, Sharma & Sharma.
3. SRC, DSIR, Bituminous Materials in Road Construction, HMSO publication.
4. Principles of Pavement Design, Yoder E.J, and Witczak M. W. John Wiley & Sons, 1975.
5. ISI and IRC related publications.

(A30154) TRANSPORTATION ENGINEERING-II
(Professional Elective-V)

B.Tech (CE) VII Semester	**L**	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

- To Study about the basics and design of various components of railway engineering and types and functions of track, junctions and railway stations.
- To study about the aircraft characteristics, planning and components of airport and types and components of docks and harbors.
- To know about various urban transportation systems and Intelligent Transportation Systems.

Unit – I

Introduction To Railway Engineering: Permanent way components – Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast, Gauge — Creep of Rails- Theories related to creep – Sleeper density.

Unit – II

Geometric Design Of Railway Track: Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve – Points and Crossings , Rail Joints, Railway Stations & Yards, Signalizing & Interlocking.

Unit – III

Airport engineering: Airport Site selection- Runway Orientation- Basic Runway Length – Corrections for Elevation, Temperature – Air Port Classification- Runway Geometric design- Factors Controlling Taxiway Layout – Terminal Area- Apron – Hanger – Blast Considerations, Typical Airport Layouts- Windrose Diagram- Runway Lightening system & Marking.

Unit- IV

Port and Harbour Engineering: Requirements of Port and Harbour, Classifications of Port & Harbour, Features of a Harbour, Planning of Harbour, Breakwater, Dry docks, Jetties, Aprons, Transit shed and

warehouses, Navigational aids, Maintenance of Port and Harbours, Inland water Transport.

Unit- V

Intelligent Transport Systems: ITS Definitions, Benefits of ITS, user services, Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), Introduction to ITS applications; Advanced Traffic Management Systems (ATIMS), Advanced Public Transportation System (APTS), ITS architecture components and standards, Over view of ITS implementations in developed countries.

Text books:

1. Railway Engineering – A text book of Transportation Engineering – S.P. Chadula – S. Chand & Co. Ltd. – (2001).
2. Highway Engineering Design – L.R. Kadiyali and Lal- Khanna Publications.
3. Airport Planning and Design- S.K. Khanna and Arora, Nemchand Bros.
4. Transportation Engineering and Planning – C.S. Papacostas, P.D. Prevedours.

References:

1. Railway Engineering – August – Prabha& Co., 15th Edition – 1994.
2. Air Transportation Planning & design – Virendhra Kumar &StatishChandhra – Gal Gotia Publishers (1999).
3. Harbour, Dock and Tunnel Engineering – R. Srinivasan.
4. Dock and Harbour Engineering – Hasmukh P Oza, Gutam H Oza.

Course outcomes:

1. Explain the basics of railway engineering & components of railway track and its geometric design.
2. Explain basic requirement for Airport.
3. Explain the basic requirements and components of harbor and docks
4. Describe the range of technologies involved in the Transportation

(A30129) COMPUTER AIDED DESIGNING AND DRAFTING

B.Tech (CE) VII Semester	L	T	P	C
	0	0	0	1.5

Course Objectives:

Understand the concept and techniques to draw.

- Create multiple designs using several of tools and Create layers to control the objects' visibility.
- Explain drawing using annotations and Plot or print the drawing by scale.
- To use constraint for certain design

CAD:

SOFTWARE:

1. STAAD PRO or Equivalent

EXCERCISIES:

1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple tower Analysis and Design
6. One Way Slab Analysis & Design
7. Two Way Slab Analysis & Design
8. Column Analysis & Design

TEXT BOOK:

1. Computer Aided Design Lab Manual by Dr.M.N.Sesha Prakash And Dr.C.S.Suresh

REFERENCES:

Text book of Engineering Drawing with auto-CAD, K.Venkata Reddy/B.S . Publications.

Course Outcomes:

The course is designed to aid participants in acquiring skills that would help them in detailed engineering drawings (2D) & basic 3D models and STAAD Pro

(A30130) ENVIRONMENTAL ENGINEERING LAB

B.Tech (CE) VII Semester	L	T	P	C
	0	0	0	1.5

Course Objective

1. To learn the handling of different equipments related to water and wastewater analysis
2. To learn about the preparations of stock and standard solutions, their handling, storage, etc.
3. To understand the different experiments involved in water and wastewater analysis.
4. To learn more about the titration techniques of chemical analysis
5. To develop skills related to report writing.

LIST OF EXPERIMENTS:

1. Determination of pH and Turbidity.
2. Determination of Conductivity and Total dissolved solids (Organic and Inorganic)
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination of iron.
6. Determination of Dissolved Oxygen.
7. Determination of Nitrates.
8. Determination of Optimum dose of coagulant.
9. Determination of Chlorine demand.
10. Determination of total Phosphorous.
11. Determination of B.O.D
12. Determination of C.O.D
13. Presumptive Coliform test.

References:

1. Environmental Engineering Lab Manual – Dr. B. Kottaiah & N. Kumaraswamy (Charotar Publications)
2. Water supply Engineering – S. K Garg (Khanna Publications)

Course Outcomes:

1. Determine the method of calibration of pH of solution(water)
2. Determine the method of turbidity, Alkalinity/Acidity, Chlorides tests in solution.
3. Determine total solids, organic solids and inorganic solids.
4. Determine iron, Dissolved Oxygen, Nitrogen, Phosphorous, B.O.D, C.O.D, Optimum coagulant dose, Chlorine

(A30131) MAJOR PROJECT PHASE -I

B.Tech (CE) VII Semester	L	T	P	C
	0	0	6	3

Each student shall start the Project Work during the VII Semester as per the instructions of the Project Guide/ Project Supervisor assigned by the Head of the Department.

a) The Project Work shall be divided and carried out in 2 phases : Phase – I (Project-I) during VII Semester, and Phase – II (Project-II) during VIII Semester, and the student has to prepare two independent Project Work Reports – one each during each phase. First Report shall include the Project Work carried out under Phase – I, and the Second Report (Final Report) shall include the Project Work carried out under Phase – I and Phase – II put together. Phase – I and Phase – II of the Project Work shall be evaluated for 100 marks each.

b) Out of the total 100 marks allotted for each Phase of the Project Work, 40 marks shall be for the Continuous Internal Evaluation(CIE), and 60 marks shall be for the End Semester Viva-voce Examination (SEE). The marks earned under CIE for both Phases of the Project shall be awarded by the Project Guide/Supervisor (based on the continuous evaluation of student's performance during the two Project Work Phases/periods); and the marks earned under SEE shall be awarded by the Project Viva-voce Committee/ Board (based on the work carried out, report prepared and the presentation made by the student at the time of Viva-voce Examination).

c) For the Project Phase - I, the Viva-voce shall be conducted at the end of the VII Semester, before the commencement of the semester End Examinations, at the Department Level by a Committee comprising of the HoD or One Professor and Supervisor (no external examiner), and the Project Phase – II Viva-voce (or Final Project Viva-voce) shall be conducted by a Committee comprising of an External Examiner, the Head of the Department and the Project Supervisor at the end of the VIII Semester, before the commencement of the semester End Examinations. The External

Examiner shall be nominated by the CoE from the panel of 3 names of external faculty members (Professors or Associate Professors outside the College) submitted by the HoD.

d) If a student does not appear for any of the two Viva-Voce examinations at the scheduled times as specified above, he may be permitted to reappear for Project Phase-I and/or Project Phase-II Viva-voce examinations, as and when they are scheduled in that semester; if he fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester(s), as and when they are scheduled, as supplementary candidate. For the registration of Project Phase-II the student must have passed Project Phase-I.

(A30132) MINI PROJECT-II

B.Tech (CE) VII Semester	L	T	P	C
	0	0	0	0

Mini-Project-II to be taken up in the college or industry during the summer vacation after VI Semester examination. The Mini-Project-II shall be evaluated during the VII Semester. The Mini-Project-II shall be submitted in a report form and should be presented before a committee, which shall be evaluated for satisfactory or Non-satisfactory. The committee consists of Head of the Department, the supervisor of mini project, a senior faculty member of the department

(A30133) INTERNSHIP-II

B.Tech (CE) VII Semester	L	T	P	C
	0	0	0	0

Internship-II, to be taken up in the college or industry during the summer vacation after VI Semester examination. The Internship-II shall be evaluated during the VII Semester. The Internship-II shall be submitted in a report form and should be presented before a committee, which shall be evaluated for satisfactory or Non-satisfactory. The committee consists of Head of the Department, the supervisor of mini project, a senior faculty member of the department

(A30155) GROUND WATER DEVELOPMENT
(Professional Elective-VI)

B.Tech (CE) VIII Semester	L	T	P	C
	3	0	0	3

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 ,porosity , Specific yield and Specific retention.

UNIT-II

Ground Water Movement: Permeability, Darcy's law, storage coefficient, Transmissivity, differential equation governing ground water flow in three dimensions derivation, ground water flow contours their applications.

UNIT-III

Steady ground water flow towards a well in confined and unconfined aquifers- Dupuit's and Theim's 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- IV

Surface and Subsurface Investigation: Surface methods of exploration- Electrical resistively and Seismic refraction methods. Subsurface methods- Geophysical logging and resistively logging. Aerial Photo grammetry applications along with case studies in Subsurface Investigation.

Artificial recharge of Ground Water: Concept of artificial recharge - recharge methods, relative metrics, Applications of GIS and Remote Sensing in Artificial Recharge of Ground water along with Case

studies.

UNIT - V

Well Construction - Drilling Equipment used for Well Equipment used for well construction - Bore log - Interpretation of Log Data.

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

TEXT BOOKS:

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

REFERENCES:

1. Groundwater Hydrology by BOWER, John Wiley & Sons.
2. Groundwater System Planning & Management - R.Willes & W.W.G.Yeh, Printice Hall.

Applied Hydrology by C.W.Fetta, CBS Publishers & Distributers.

Course Outcomes

1. Explain the ground water occurrence, ground water movement.
2. Analysis of pumping test, surface and subsurface Investigation.
3. Explain the artificial recharge of ground water, saline water intrusion in aquifer and groundwater basin management.
4. Explain the types of floe and their importance and well construction.

(A30156) GEO-ENVIRONMENTAL ENGINEERING
(PE – VI)

B.Tech (CE) VIII Semester	**L**	**T**	**P**	**C**
	3	0	0	3

UNIT-I

Sources and Site Characterization: Scope of Geo-environmental Engineering, Various Sources of Contaminations, Need for contaminated site characterization; and Characterization methods.

UNIT-II

Solid and Hazardous Waste Management: Classification of waste, Characterization solid wastes, Environmental Concerns with waste, waste management strategies.

UNIT-III

Contaminant Transport: Transport process, Mass-transfer process, Modeling, NAPL

UNIT-IV

Remediation Techniques: Objectives of site remediation, various active and passive methods, Bioremediation, Phytoremediation, Remediation of NAPL sites.

UNIT-V

Landfills: Types of landfills, Site Selection, Waste Containment Liners, Leachate collection system, Cover system, Gas collection system.

TEXT BOOKS:

1. Phillip B. Bedient, Refai, H. S. & Newell C. J. - Ground Water Contamination - Prentice Hall Publications, 4th Edition, 2008.
2. Sharma, H. D. and Reddy, K. R. - Geoenvironmental Engineering, John Wiley & Sons (2004).

REFERENCES:

1. Rowe, R. K. - Geotechnical & Geoenvironmental Engineering Handbook, Kluwer Academic, 2001.
2. Reddi, L. N. and Inyang, H. I. - Geoenvironmental Engineering Principles and Applications, Marcel. Dekker, Inc., New York (2000).
3. LaGrega, M. D., Buckingham, P. L. and Evans, J. C. - Hazardous Waste Management, New York: McGraw-Hill, 2001.

Course Outcomes

1. Explain the Sources and Site
2. Explain the Characterization Solid and Hazardous
3. Evaluate the Waste Management contaminant
4. Explain the Transport: Transport process Remediation Techniques and Landfills

(A30157) GROUND IMPROVEMENT TECHNIQUES (PE – VI)

B.Tech (CE) VII Semester	L	T	P	C
	3	0	0	3

Course Objectives

1. Learning of various ground improvement techniques and surface and sub-surface compaction techniques.
2. Learning of preloading and dewatering techniques.
3. Stabilization of soil by physical and chemical admixtures.
4. Learning of geosynthetics functions and design of reinforced soil structures.

Unit-I

Introduction to Ground Improvement Modification: Need and objectives, Identification of soil types, In situ and laboratory tests to characterize problematic soils, Mechanical, Hydraulic, Physico-chemical, Electrical, Thermal methods and their applications.

Unit-II

Mechanical Modification: Deep compaction Techniques- Blasting Vibrocompaction, Dynamic Tamping and compaction piles

Unit-III

Hydraulic Modification- Objectives and techniques, traditional dewatering methods and their choice, Design of dewatering system, Electro-osmosis, Electro-Kinetic dewatering, Filtration, Drainage and seepage control with Geo synthetics, preloading and vertical drains

Unit-IV

Physical and Chemical Modification- Modification by admixtures, Shotcreating and Guinting Technology, Modification at depth by grouting, Crack Grouting and compaction grouting ,Jet grouting, Thermal modification, Ground freezing.

Unit-V

Modification by inclusions and confinement: Soil reinforcement, reinforcement wit strip, and grid reinforced soil. In-situ ground reinforcement ground anchors, rock bolting and soil nailing.

Textbooks:

1. Hausmann. M.R. (1990) – Engineering Principles of Ground Modifications, McGraw Hill publications.

References:

1. Koerner. R.M (1994)- Designing with Geosynthesis –Prentice Hall New Jersey
2. Jones C.J.F.P (1985)- Earth Reinforcement and Soil structures – Butterworths, London
3. Xianthakos, Abreimson and Bruce- Ground control and Improvement
4. Mosley- Ground Improvement

Course Outcomes:

1. Explain principles, applications, and design procedures for various ground improvement techniques and piling methods.
2. To assess the effectiveness of a ground improvement technique, and the performance of piled foundations and structures using analytical/theoretical/ numerical calculations.
3. Evaluate alternative solutions and the effectiveness before, during and after using ground improvement techniques
4. Apply techniques in ground improvement.

(A30134) TECHNICAL SEMINAR-II

B.Tech (CE) VIII Semester

L	T	P	C
2	0	0	2

- For the Technical Seminar-II, the student shall collect the information on a specialized topic related to his branch other than the Mini projects-I & II/ Internships-I & II/ Major Projects Phase-I & II topic with due approval of the Head of the department and prepare a technical report and submit to the department.
- The presentation demonstrating understanding of the topic and technical report shall be evaluated by a Departmental committee consisting of the Head of the department, Technical Seminar-II supervisor and a senior faculty member from the department.
- The Technical Seminar-II will be evaluated for 100 marks. There shall be no SEE or external examination for the Technical Seminar-II.

(A30135) MAJOR PROJECT PHASE -II

B.Tech (CE) VIII Semester

L	T	P	C
0	0	14	7

Each student shall start the Project Work during the VII Semester as per the instructions of the Project Guide/ Project Supervisor assigned by the Head of the Department.

a) The Project Work shall be divided and carried out in 2 phases : Phase – I (Project-I) during VII Semester, and Phase – II (Project-II) during VIII Semester, and the student has to prepare two independent Project Work Reports – one each during each phase. First Report shall include the Project Work carried out under Phase – I, and the Second Report (Final Report) shall include the Project Work carried out under Phase – I and Phase – II put together. Phase – I and Phase – II of the Project Work shall be evaluated for 100 marks each.

b) Out of the total 100 marks allotted for each Phase of the Project Work, 40 marks shall be for the Continuous Internal Evaluation(CIE), and 60 marks shall be for the End Semester Viva-voce Examination (SEE). The marks earned under CIE for both Phases of the Project shall be awarded by the Project Guide/Supervisor (based on the continuous evaluation of student's performance during the two Project Work Phases/periods); and the marks earned under SEE shall be awarded by the Project Viva-voce Committee/ Board (based on the work carried out, report prepared and the presentation made by the student at the time of Viva-voce Examination).

c) For the Project Phase - I, the Viva-voce shall be conducted at the end of the VII Semester, before the commencement of the semester End Examinations, at the Department Level by a Committee comprising of the HoD or One Professor and Supervisor (no external examiner), and the Project Phase – II Viva-voce (or Final Project Viva-voce) shall be conducted by a Committee comprising of an External Examiner, the Head of the

Department and the Project Supervisor at the end of the VIII Semester, before the commencement of the semester End Examinations. The External Examiner shall be nominated by the CoE from the panel of 3 names of external faculty members (Professors or Associate Professors outside the College) submitted by the HoD.

d) If a student does not appear for any of the two Viva-Voce examinations at the scheduled times as specified above, he may be permitted to reappear for Project Phase-I and/or Project Phase-II Viva-voce examinations, as and when they are scheduled in that semester; if he fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester(s), as and when they are scheduled, as supplementary candidate. For the registration of Project Phase-II the student must have passed Project Phase-I.

OPEN ELECTIVES

(A30554) JAVA PROGRAMMING
(Open Elective: Offered by CSE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT-I

Introduction: Java Essentials, JVM, Java Features, Creation and Execution of Programs, Data Types, Type Conversion, Casting, Conditional Statements, Loops, Branching Mechanism, Classes, Objects, Class Declaration, Creating Objects, Method Declaration and Invocation, Method Overloading, Constructors– Parameterized Constructors, Constructor Overloading, Cleaning-up unused Objects, Class Variables & Methods-static Keyword, this Keyword.

UNIT–II

Arrays: One-Dimensional Arrays, Two-Dimensional Arrays, Command-Line Arguments, Inner Class. **Inheritance**: Introduction, Types of Inheritance, extends Keyword, Examples, Method Overriding, super, final Keywords, Abstract classes, Interfaces, Abstract Classes Verses Interfaces.

UNIT–III

Packages–Creating and Using Packages, Access Protection, Wrapper Classes, String Class, StringBuffer Class. **Exception**: Introduction, Types, Exception Handling Techniques, User-Defined Exception.

UNIT-IV

Multithreading: Introduction, Main Thread, Creation of New Threads – By Inheriting the Thread Class or Implementing the Runnable Interface, Thread Lifecycle, Thread Priority, Synchronization.

UNIT–V

java.io Package, File Class, FileInputStream Class, FileOutputStream

Class, Scanner Class, BufferedInputStream Class, BufferedOutputStream Class, RandomAccessFile Class.

Text Books:

1.Sachin Malhotra, Saurabh Choudhary, Programming in Java,Oxford publications.

Reference Books:

1.Herbert Schildt, Java: The Complete Reference, McGraw Hill Education;

2. C. Thomas Wu, An introduction to object-oriented programming with Java, McGraw-Hill Education;

Course Outcomes

Upon successful completion of the course, student will be able to:

1. Explain the OOPs concepts.
2. Describe various types of Inheritance in Java.
3. Develop robust Java applications using Packages, Exceptions.
4. Implement Java applications using Java Threads.
5. Design Java applications with various modes of Input and output

(A30531) PYTHON PROGRAMMING
(Open Elective: Offered by CSE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT-I

Introduction to Python, Installing Python. How a Program Works, Using Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, Operators. Type conversions, Expressions, More about Data Output. Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables. Repetition Structures: Introduction, while loop, for loop, Calculating a Running Total, Input Validation Loops, Nested Loops.
Data types and Expressions: Strings, Assignment and Comments, Numeric Data Types and Character Sets, Expressions, Functions and Modules.

UNIT–II

Control Statements: Definite Iteration, Formatting Text for Output, Selection, Conditional Iteration. File and Exceptions: Introduction to File Input and Output, Using Loops to Process Files, Processing Records, Exceptions. Functions: Introduction, Defining and Calling a Void Function, designing a Program to Use Functions, Local Variables, Passing Arguments to Functions, Global Variables and Global Constants, Value-Returning Functions-Generating Random Numbers, the math Module, Storing Functions in Modules.

UNIT–III

Python Data structures: Accessing Characters and Substrings in a String, Strings and Number System, String Methods, Basic String Operations, String Slicing, Testing, Searching, and Manipulating Strings. Text Files, Data Encryption, Lists, Introduction to Lists, List slicing, Finding Items in Lists with the in Operator, List Methods and

Useful Built-in Functions, Copying Lists, Processing Lists, Two-Dimensional Lists, Tuples Sequences, Tuples. Dictionaries and Sets: Dictionaries, Sets, Serializing Objects. Recursion: Introduction, Problem Solving with Recursion, Examples of Recursive Algorithms

UNIT-IV

Design with Classes: Classes and Objects, Classes and Functions, Classes and Methods, Working with Instances, Inheritance and Polymorphism. Object-Oriented Programming: Procedural and Object-Oriented Programming, Classes, techniques for Designing Classes

UNIT–V

Graphical User Interfaces: Behavior of terminal based programs and GUI-based programs, Coding simple GUI-based programs, other useful GUI resources. GUI Programming: Graphical User Interfaces, Using the tkinter Module, Display text with Label Widgets, Organizing Widgets with Frames, Button Widgets and Info Dialog Boxes, Getting Input with Entry Widget, Using Labels as Output Fields, Radio Buttons, Check Buttons.

Simple Graphics and Image Processing: Overview of Turtle Graphics, Two dimensional Shapes, Colors and RBG System, Image Processing.

Text Books:

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning.
2. Think Python First Edition, by Allen B. Downey, Orielly publishing

Reference Books:

1. Introduction to Computation and Programming Using Python. John V. Guttag, The MIT Press.
2. James Payne, Beginning Python using Python 2.6 and Python 3, Wrox publishing
3. Paul Gries, Practical Programming: An Introduction to Computer Science using Python 3, The Pragmatic Bookshelf,

Course Outcomes

Upon successful completion of the course, student will be able to:

1. Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python
2. Express different Decision-Making statements and Functions
3. Interpret Object oriented programming in Python
4. summarize different File handling operations
5. Explain how to design GUI Applications in Python and evaluate different database Operations.

(A30555)INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS

(Open Elective: Offered by CSE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT-I

Introduction to Databases: Introduction, Traditional File-Based Systems, Database Approach, Roles in the Database Environment, Advantages and Disadvantages of DBMS, The Three-Level ANSI-SPARC Architecture,

Database Languages, Data Models, Functions of a DBMS, Components of DBMS. Relational Model: Introduction, Terminology, Integrity Constraints, Views. The Relational Algebra: Unary Operations, Set Operations, Join Operations, Division Operation, Aggregation and Grouping Operations.

UNIT–II

SQL: The ISO SQL Data Types, Integrity Enhancement Feature–Domain Constraints, Entity Integrity, Referential Integrity, General Constraints, Data Definition–Creating a Database, creating a Table, Changing a Table Definition, removing a Table, Creating an Index, Removing an Index, Views–Creating a View, Removing a View, View Resolution, Restrictions on Views, View Updatability 'WITH CHECK OPTION', Advantages and Disadvantages of Views, View Materialization.

UNIT–III

SQL: Introduction, Data Manipulation–Simple Queries, Sorting Results, Using the SQL Aggregate Functions, Grouping Results, Sub-queries, ANY and ALL, Multi-table Queries, EXISTS and NOT EXIST, Combining Result Tables, Database Updates.

UNIT-IV

Advanced SQL: The SQL Programming Language–Declarations, Assignments, Control Statements, Exceptions, Cursors, Subprograms,

Stored Procedures, Functions, and Packages, Triggers, Recursion.

UNIT–V

Normalization: The Purpose of Normalization, How Normalization Supports Database Design, Data Redundancy and Update Anomalies, Functional Dependencies in brief, The Process of Normalization,1NF, 2NF, 3NF, BCNF.

Text Books:

1. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems,McGraw-Hill Education, 2003
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, McGraw-Hill Education

Reference Books:

1. Thomas M. Connolly, Carolyn E. Begg, Database Systems–A Practical Approach to Design, Implementation, and Management, Pearson publisher
2. RamezElmasri, Shamkant B. Navathe, Fundamentals of Database Systems,Pearson publisher

Course Outcomes

Upon successful completion of the course, student will be able to:

1. Describe Database Management System Architecture.
2. Create, update, modify Relational Database Objects.
3. Manipulate data in Relational Database
4. Develop PL/SQL programs using Cursors, Subprograms, Stored Procedures, Functions, and Packages, Triggers.
5. Explain the purpose of normalization and types Normal forms.

(A30537)DATA ANALYTICS WITH R
(OPEN ELECTIVE: Offered by CSE Department)

B. Tech. (CE)

UNIT -I

Introduction, how to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes. R Programming Structures, Control Statements, Loops, - Looping Over Non-Vector Sets, - If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion

UNIT –II

Introduction of Data Science, Basic Data Analytics using R, R Graphical User Interfaces Data Import and Export, Attribute and Data Types, Descriptive Statistics, Exploratory Data Analysis, Visualization Before Analysis, Dirty Data, visualizing a Single Variable, Examining Multiple Variables, Data Exploration Versus Presentation

UNIT –III

Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains

UNIT –IV

Discover R‘s packages to do graphics and create own data visualizations. Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function ,Customizing Graphs, Saving Graphs to Files. Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests, ANOVA

Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression-

other Generalized Linear Models-Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests,

UNIT –V

Overview of Clustering, K-means, Use Cases, Overview of the Method, Perform K-means Analysis using R. Classification, Decision Trees, Overview of a Decision Tree, Decision Tree Algorithms, Evaluating a Decision Tree. Decision Tree in R, Bayes 'Theorem, Naïve Bayes Classifier, Smoothing, Naïve Bayes in R

Text Books:

1. The Art of R Programming, Norman Matloff, Cengage Learning
2. David Dietrich, Barry Heller and Beibei Yang, ―Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data‖, EMC Education Services,

Reference Books:

1. R in Action, Rob Kabacoff, Manning Nathan Marz, James Warren, ―Big Data-Principles and best practices of scalable real-time data systems‖, DreamTech Press,

Course Outcomes

Upon successful completion of the course, student will be able to:

1. Write simple applications using R programming language constructs.
2. Explore data and analyze it using R.
3. Implement classification, clustering and feature selection methods with R.
4. Understand Regression Generalized Linear Models.
5. Perform K-means Analysis using R.

(A30557)WEB PROGRAMMING

(OPEN ELECTIVE: Offered by CSE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

Unit-I

Structuring Documents for the Web: Introducing HTML and XHTML, Basic Text Formatting, Presentational Elements, Phrase Elements, Lists, Editing Text, Core Elements and Attributes, Attribute Groups Links and Navigation: Basic Links, Creating Links with the **<a>** Element, Advanced E- mail Links. Images, Audio, and Video: Adding Images Using the **<img>** Element, Using Images as Links Image Maps, Choosing the Right Image Format, Adding Flash, Video and Audio to your web pages. Tables: Introducing Tables, Grouping Section of a Table, Nested Tables, Accessing Tables Forms: Introducing Forms, Form Controls, Sending Form Data to the Server Frames: Introducing Frameset, <frame>Element, Creating Links Between Frames, Setting a Default Target Frame Using **<base>**Element, Nested Framesets, Inline or Floating Frames with **<iframe>**. Changing font size, color using of text using <font> Element, scrolling text/image using <marquee> Element

Unit-II

Cascading Style Sheets: Introducing CSS, where you can Add CSS Rules. **CSS Properties**: Controlling Text, Text Formatting, Text Pseudo Classes, Selectors, Lengths, Introducing the Box Model. **More Cascading Style Sheets:** Links, Lists, Tables, Outlines, the: focus and: activate Pseudo classes Generated Content, Miscellaneous Properties, Additional Rules, Positioning and Layout with CSS, **Page Layout**: Understating the Site's Audience, Page Size, Designing Pages, coding your Design, Developing for Mobile Devices. **Design Issues:** Typography, Navigation, Tables, Forms.

Unit-III

Learning JavaScript: How to Add Script to Your Pages, the Document Object Model, Variables, Operators, Functions, Control Statements, Looping, Events, Built- In Objects, Working with JavaScript: Practical Tips for Writing Scripts, Form Validation, Form

Enhancements, JavaScript Libraries. Putting Your site on the web: Meta tags, testing your site, Taking the Leap to Live, Telling the World about your site, Understanding your visitors.

Unit-IV

XML - Introduction, XML Basics, Structuring Data, XML Namespaces, Document Type Definitions (DTDs), W3C XML Schema Documents, XML Vocabularies, Extensible Style sheet Language and XSL Transformations, Document Object Model (DOM).

Unit-V

Ajax-Enabled Rich Internet Applications: introduction, history of Ajax, traditional web applications Vs Ajax Applications, RIAs with Ajax, Ajax example using XML HttpRequest object, XML and DOM, creating full scale Ajax-enabled application, Dojo Toolkit.

TEXT BOOKS:

1. Jon Duckett, Beginning HTML, XTML, CSS and JavaScript
2. Dietel and Dietel : "Internet and World Wide Web - How to Program", 5th Edition, PHI/Pearson Education, 2011.

1. **REFERENCE BOOKS:**

3. Chris Bates, Web Programming
4. M. Srinivasan, Web Technology: Theory and Practice
5. Achyut S. Godbole, AtulKahate, Web Technologies
6. Kogent Learning Solutions Inc, Web Technologies Black Book
7. Ralph Moseley and M. T. Savaliya, Developing Web Applications

Course Outcomes

Students shall be able to

1. Write well-structured, easily maintained, standards-compliant, accessible HTML code.
2. write well-structured, easily maintained, standards-compliant CSS code to present HTML pages in different way
3. Use JavaScript to add dynamic content to pages.
4. Effectively debug JavaScript code, making use of good practice and debugging tools.
5. Use JavaScript to access and use web services for dynamic content (AJAX, JSON, etc.)

(A30542) CLOUD COMPUTING

(OPEN ELECTIVE: Offered by CSE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT -I

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

UNIT –II

Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models.

UNIT –III

Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

UNIT –IV

Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

UNIT –V

Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue, service, Microsoft, Windows
Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjra soft, Aneka Platform.

Text Books:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

Reference Books:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and
Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD,rp2011.

Course Outcomes

The student shall be able to
1. Explain various service delivery models of a cloud computing architecture.
2. Explain the ways in which the cloud can be programmed and deployed.
3. State cloud service providers.

(A30538)DEEP LEARNING

(Open Elective: Offered by CSE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT -I

Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed - forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms.

UNIT –II

Regularization for Deep Learning Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised learning, Multi-task learning, Early Stopping, Parameter Typing and Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier.

UNIT –III

Optimization for Training Deep Models:

How Learning Differs from Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

UNIT –IV

Convolutional Networks

The Convolution Operation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, The Neuroscientific Basis for Convolutional Networks, Convolutional Networks and the History of Deep Learning.

UNIT –V

Applications: Large-Scale Deep Learning, Computer Vision, Speech recognition, Natural Language Processing, Other Applications.

Text Books:

1. Deep Learning, Ian Goodfellow, YoshuaBengio and Aaron Courville, In Preparation for MIT Press.
2. Artificial Neural Networks. Yegnanarayana, Prentice- Hall of India,

Reference Books:

1. Neural Networks and Learning Machines. Haykin, Prentice Hall of India,
2. Pattern Recognition and Machine Learning, C.M. Bishop, Springer,

Course Outcomes

Upon successful completion of the course, student will be able to:

1. Explain Deep Feed-forward networks, Gradient-Based learning,
2. Describe regularization techniques for Deep learning
3. Differentiate learning and optimization in Deep learning.
4. State the significance of Convolutional Networks
5. State the applications of Deep Learning.

(A30559)INTRODUCTION TO DATA SCIENCE
(OPEN ELECTIVE)

B. Tech. (CE)

L	T	P	C
3	0	0	3

Unit-I

Introduction to Data Science: Concept of Data Science, Traits of Big data, Web Scraping, Analysis vs Reporting.

Introduction to Programming Tools for Data Science: Toolkits using Python- Matplotlib, NumPy, Scikit-learn, NLTK.

Unit-II

Visualizing Data- Bar Charts, Line Charts, Scatterplots. **Working with data-** Reading Files, Scraping the Web, Using APIs (Example: Using the Twitter APIs), Cleaning and Munging, Manipulating Data, Rescaling, Dimensionality Reduction

Unit-III

Overview of Machine learning concepts – Over fitting and train/test splits, Types of Machine learning – Supervised, Unsupervised, Reinforced learning, Introduction to Bayes Theorem, Linear Regression- model assumptions, regularization (lasso, ridge, elastic net), **Classification and Regression algorithms-** Naïve Bayes, K-Nearest Neighbors, logistic regression, support vector machines (SVM).

Unit-IV

Decision trees, and random forest, Classification Errors, Analysis of Time Series- Linear Systems Analysis, Nonlinear Dynamics, Rule Induction, Neural Networks- Learning & Generalization, Overview of Deep Learning.

Unit-V

Case Studies of Data Science Application: Weather forecasting, Stock market prediction, Object recognition, Real Time Sentiment Analysis.

TEXT BOOKS:

1. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media
2. AurélienGéron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, O'Reilly Media
3. Jain V.K., "Data Sciences", Khanna Publishing House, Delhi.
4. Jain V.K., "Big Data and Hadoop", Khanna Publishing House, Delhi.
5. Jeeva Jose, "Machine Learning", Khanna Publishing House, Delhi.

REFERENCE BOOKS:

1. Chopra Rajiv, "Machine Learning", Khanna Publishing House, Delhi.
2. Ian Goodfellow, YoshuaBengio and Aaron Courville, "Deep Learning", MIT Presshttp://www.deeplearningbook.org
3. Jiawei Han and Jian Pei, "Data Mining Concepts and Techniques", Third Edition, MorganKaufmann Publishers

COURSE OUTCOMES:

At end of this course, the students will be able to:

1. Demonstrate understanding of the mathematical foundations needed for data science.
2. Collect, explore, clean, munge and manipulate data.
3. Implement models such as k-nearest Neighbors, Naive Bayes, linear and logistic regression, decision trees, neural networks and clustering.
4. Build data science applications using Python based toolkits.

(A30471) PRINCIPLES OF ELECTRONIC COMMUNICATIONS
(Open Elective: offered by ECE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

Unit- I: Introduction to Communication System
Block diagram of Communication system, Radio communication: Types of communications, Analog, Pulse, and Digital, Types of Signals, Fourier Transform for various signals, Fourier Spectrum, Power spectral density, Correlation, Convolution, Time Division Multiplexing, Frequency Division Multiplexing.

Unit- II: Amplitude Modulation
Need for modulation, Types of Amplitude modulation: AM, DSBSC, SSBSC, Power and BW requirements, Generation of AM, DSBSC, SSBSC, Demodulation of AM: Diode detector, Coherent detection of DSBSC& SSBSC.

Unit- III: Angle Modulation
Frequency & Phase Modulation, Advantages of FM over AM, Bandwidth consideration, Narrow band FM, Wide band FM, Comparison of FM and PM.
Pulse Modulation
Sampling, Sampling Theorem for Band limited signals, Types of Pulse modulation: PAM, PWM, PPM, Generation and demodulation of PAM, PWM, and PPM.

Unit- IV: Digital communication
Advantage, Block diagram of PCM, Quantization error, DPCM, Adaptive DPCM, DM and Comparison.
Digital Modulation: ASK, FSK, PSK, DPSK, QPSK, coherent and Non-coherent reception.

Unit- V: Information Theory
Concept of Information, Rate of Information and entropy, Source

coding for optimum rate of information, Coding efficiency, Shannon Fano coding, Huffman Coding.
Error Control Coding: Introduction, Error detection and Correction codes, Block codes, Convolution codes.

Textbooks:
1. Communication Systems Analog and Digital–R. P. Singh, SD Sapre, TMH.
2. Principles of Communication Systems – H Taub& D. Schilling, GautamSahe, TMH.
3. Communication Systems – B.P. Lathi, BS Publication.

References:
1. Analog and Digital Communication – K. Sam Shanmugam, Willey.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH.
3. Digital Communications- John G. Proakis, MasoudSalehi-, Mcgarw- Hill.

Course Outcomes

Upon successful completion of the course, student will be able to:
1. Understand the concept of Communication systems.
2. Describe the concept of AM and FM transmission and Reception.
3. Analyze the concepts of digital communication systems.
4. Compare the different digital modulation techniques.
5. Discuss about different error detecting and error correcting codes like block codes, cyclic codes and convolution codes.

(A30472)BASIC ELECTRONICS ENGINEERING
(Open Elective: offered by ECE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT-I:

P-N Junction Diode:

Basics of semiconductor materials, P-N junction as a Diode, Diode Equation, Volt-Ampere Characteristics, Temperature dependence of V-I characteristics, Ideal versus Practical- Resistance levels (Static and Dynamic). Breakdown Mechanisms in Semiconductor Diodes, Zener Diode Characteristics, Voltage Regulation using Zener diode.

UNIT- II:

Rectifiers and Filters:

The P-N junction as a Rectifier, Half wave Rectifier, Full wave Rectifier, Bridge Rectifier, Harmonic components in a Rectifier Circuit, Inductor Filters, Capacitor Filters, L- Section Filters, Pi-Section Filters, Comparison of Filters,.

UNIT –III:

Bipolar Junction Transistor:

The Junction Transistor, Transistor Current Components, , Transistor as an Amplifier, transistor Construction, BJT Operation, symbol, Common base, Common Emitter and Common Collector Configurations, Limits of operation, BJT Specifications, BJT Hybrid model , Determination of H parameters from Transistor characteristics, Comparison of CB, CE, and CC configurations.

UNIT- IV:

Transistor Biasing and Stabilization: Operating Point, The DC and AC Load lines, need for Biasing, Fixed Bias, Collector to base bias Feedback, Voltage Divider Bias, Bias Stability, Stabilization Factors, Stabilization against variations in V_{BE} and β, Bias Compensation using Diodes and Transistors, Thermal Runaway, Thermal Stability.

UNIT- V:

Field Effect Transistor: The Junction Field Effect Transistor (Construction, principle of operation, Symbol)- Pinch-off Voltage- Volt-Ampere characteristics, The JFET small signal model, MOSFET (Construction, principle of operation, Symbol), MOSFET Characteristics in Enhancement and Depletion modes.

TEXT BOOKS:

1. Millman's Electronic Devices & Circuits-J. Millman, C.C. Halkais&SatyabrataJit, TMH.
2. Electronic Devices & Circuits- Mohammad Rashid, Cengage Learning,
3. Electronic Devices & Circuits- David A. Bell,, Oxford

REFERENCE BOOKS:

1. Integrated Electronics- J. Millman and Christos C. Halkais, TMH.
2. Electronic Devices and Circuits- R.L. Boylstad and Louis Nashelsky, PEI/PHI
3. Electronic Devices and Circuits- B. P. Singh, Rekha Singh, Pearson.
4. Electronic Devices and Circuits- K. Lal Kishore, BSP.
5. Electronic Devices and Circuits- Anil K. Maini, Varsha Agarwal, Wiley India Pvt Ltd.
6. Electronic Devices and Circuits- S. Salivahanan, N. Suresh Kumar, A. Vallavaraj, TMH.

Course outcomes:

Upon successful completion of the course, student will be able to:

1. Understand and analyze the different types of diodes and its characteristics.
2. Construct various rectifiers and filters.
3. Analyze the characteristics of BJT & FET.
4. Design the DC bias circuitry of BJT and FET.

(A30473) IMAGE PROCESSING
(Open Elective: Offered by ECE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

Unit- I: Digital Image Fundamentals
Digital Image fundamentals, Components of Digital Image Processing, Sampling andQuantization, Relationship between pixels.
Image Transforms: 2-D FFT, Properties, Walsh transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform.

Unit-II: Image Enhancement (Spatial Domain)
Introduction, Image Enhancement in Spatial domain, Enhancement through point processing, Types of point processing, Histogram manipulation, Linear and nonlinear gray level Transformation, Local or neighborhood operation, Median filter, image Smoothing & Sharpening
Image Enhancement (Frequency Domain)
Filtering in Frequency domain, Low pass filter (Smoothing) and hugh pass filter (Sharpening),image Smoothing&Sharpening.

Unit- III: Image Restoration
Degradation model, Algebraic approach to restoration, Inverse filtering, least mean square filters, Constrained Least Squares Restoration.

Unit- IV: Image Segmentation
Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation.
Morphological Image Processing: Dilation and Erosion, Structuring Element Decomposition, Opening and Closing, the Hit or Miss Transformation.

Unit- V: Image Compression
Redundancies and their removal methods, Fidelity criteria, Image

compression models, Huffman and Arithmetic Coding, Error free compression, Lossy compression, Lossy and Lossless Predictive Coding, Transform based Compression, JPEG 2000 Standards.

Text Books:

1. Digital Image Processing – Rafael C. Gonzalez, Rechard E. WoodsPearson
2. Digital Image Processing – S. Jayaraman, S Esakkirajan, T Veerakumar- TMH,

Reference Books:

1. Digital Image Processing using MATLAB – Rafael C. Gonzalez, Richard E woods and Steven L. Eddings, TMH.
2. Fundamentals of Digital Image Processing – A. K. Jain, PHI,.
3. Digital Image processing and Computer vision – Somka, Hlavac, Boyle Cengage learning (Indian edition).
4. Introductory Computer vision Imaging Techniques and Solutions – Adrian low
5. Introduction to Image Processing & Analysis – John C. Russ, J. Christian Russ, CRC press.

Course outcomes

Upon successful completion of the course, student will be able to:

1. Describe the fundamentals of digital image processing.
2. Distinguish between spatial domain enhancement and frequency domain enhancement.
3. Analyze the image restoration and segmentation methods.
4. Discriminate between lossless and lossy compression techniques.

(A30474) DIGITAL ELECTRONICS
(Open Elective: Offered by ECE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT I:

NUMBER SYSTEM AND BOOLEAN ALGEBRA AND SWITCHING FUNCTIONS

Number Systems, Base Conversion Methods, Complements of numbers, Codes – binary codes, Binary Coded Decimal code and its properties, unit Distance Codes, Alpha Numeric Codes, Error Detecting and Correcting Codes.

Boolean Algebra: Basic theorems and properties - Switching Functions, Canonical and Standard forms-Algebraic simplification Digital Logic Gates, Properties of XOR gates & Universal gates-Multilevel NAND/NOR realizations.

UNIT-II:

MINIMIZATION AND DESIGN OF COMBINATIONAL CIRCUITS:

Introduction, The Minimization methods with theorem, The Karnaugh Map Method, Five and Six Variable Maps , Prime and Essential Implicants, Don't Care Map Entries, Minimization using tabular method, Partially Specified Expressions Multi Output minimization and combinational design, Arithmetic circuits, Comparator, Multiplexer, Code-converters.

UNIT-III:

SEQUENTIAL MACHINES FUNDAMENTALS

Introduction, Basic Architectural Distinctions between combinational and sequential circuits. The Binary Cell, Fundamentals of Sequential Machine Operations, The Flip-flop, D-Latch &Flip-flop, the clocked T-flip-flop, the clocked J-K flip-flop, Design of a clocked flip-flop. Conversion from one type of Flip-Flop to another, Timing and Triggering Consideration.

UNIT-IV:

SEQUENTIAL CIRCUIT DESIGN AND ANALYSIS

Introduction, State Diagram, Analysis of synchronous Sequential Circuits, Approaches to the Design of Synchronous Sequential Finite State Machines, Design Aspects, State Reduction, Design Steps, Realization using Flip-Flops.

Counters –Design of single mode counter, Ripple counter, Ring counter, Shift register, Shift register sequences, Ring counter using Shift register.

UNIT-V:

FSM Charts: Finitestate machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table.

TEXT BOOKS:

1. Switching& Finite Automata theory – ZviKohavi, &Niraj K. Jha, Cambridge.
2. Digital Design -Morris Mano, PHI,.

REFERENCE BOOKS:

1. Introduction to switching design and logic design _ Fredriac J. Hill, Gerald R. Peterson, John Wiley & Sons Inc
2. Digital fundamentals – A Systems approach-Thomas L. Floyd, Pearson,.
3. Digital logic design- Ye Brian and Holds Worth, Elsevier.
4. Fundamentals of Logic Design - Charles H. Roth, Thomson Publications

   Digital Logic Applications and Design - John M. Yarbrough, Thomson Publications,.
5. Digital Logic and state machine design – Comer, oxford,.

Course Outcomes

Upon successful completion of the course, student will be able to:

1. Understand the various number systems and conversions.
2. Solve the Boolean expressions using Boolean laws and minimization techniques.
3. Design and analyze the combinational circuits.
4. Design and analyze the sequential circuits.

(A30477) FUNDAMENTALS OF EMBEDDED SYSTEMS
(Open Elective: Offered by ECE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

Unit- I: Introduction to Embedded Systems

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems

Unit- II: Typical Embedded System

Core of the Embedded System: General Purpose and Domain Specific Processors, Memory, ROM, RAM, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: On-board and External Communication Interfaces.

Unit –III: Embedded Firmware

Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

Unit – IV: RTOS Based Embedded System Design

Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

Unit – V: Task Communication

Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/ Synchronization issues, Task Synchronization Techniques, Device Drivers

Text Books:

1. Introduction to Embedded Systems – Shibu K.V. McGraw Hill
2. Embedded Systems – Raj Kamal, TMH

Reference Books:

1. Embedded System Design – Frank Vahid, Tony Givargis, John Wiley.

2. Embedded Systems – Lyla, Pearson,
3. An Embedded Software Primer- David E Simon, Pearson Education

Course outcomes:

Upon successful completion of the course, student will be able to:

1. Understand the basics of embedded systems and its types.
2. Study the various types of memories, sensors and Input / Output devices.
3. Discuss the embedded firmware for various applications.
4. Interpret the characteristics of Real time operating Systems.

(A30478) SENSORS & TRANSDUCERS
(Open Elective: Offered by ECE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

Unit – I: Introduction: Definition, principle of sensing & transduction, classification.
Mechanical and Electromechanical sensor: Resistive (potentiometric type): Forms, material, resolution, accuracy, sensitivity. Strain gauge: Theory, type, materials, design consideration, sensitivity, gauge factor, variation with temperature, adhesive, rosettes. Inductive sensor: common types- Reluctance change type, Mutual inductance change type, Magnetostrictive type, material, construction and input output variable, Ferromagnetic plunger type, short analysis.

Unit – II: Capacitive sensors: variable distance-parallel plate type, variable area- parallel plate, serrated plate/teeth type and cylindrical type, variable dielectric constant type, calculation of sensitivity, Proximity sensor. Stretched diaphragm type: microphone, response characteristics. Piezoelectric element: piezoelectric effect, charge and voltage co-efficient, crystal model, materials, natural & synthetic type, their comparison, force & stress sensing, ultrasonic sensors.

Unit – III: Thermal sensors: Resistance change type: RTD materials, tip sensitive & stem sensitive type, Thermistor material, shape, ranges and accuracy specification. Thermoemf sensor: types, thermoelectric power, general consideration, Junction semiconductor type IC and PTAT type. Radiation sensors: types, characteristics and comparison, Pyro electric type.

Unit – IV: Magnetic sensors: Sensor based on Villari effect for assessment of force, torque, proximity, Wiedemann effect for yoke coil sensors, Thomson effect, Hall effect, and Hall drive, performance characteristics. Radiation sensors: LDR, Photovoltaic cells, photodiodes, photo emissive celltypes, materials, construction, response. Geiger counters, Scintillation detectors.

Unit – V: Film Sensors: Thick film and thin film types, Electroanalytic

sensors – Electrochemical cell, Polarization types, and membrane electrode types.
Biosensors, Smart/Intelligent sensors, Nano-sensors, Nano-tube sensors, molecular and quantum sensors.

TEXT BOOKS:

1. Sensor & transducers, D. Patranabis, PHI
2. Instrument transducers, H.K.P. Neubert, Oxford University press.
3. Measurement systems: application & design, E.A.Doebelin, McGraw Hill.

REFERENCE BOOKS:

1. Sensor and Transducers, Third Edition, Ian Sinclair, Newnes.
2. Sensor Technology, Hand Book, JON S. Wilson, Newnes.ELSEVIER.
3. Sensor and Transducers, Characteristics, Applications, Instrumentation, Interfacing, Second Edition, M.J.Usher and D.A.Keating, Macmillan Press Ltd.

COURSE OUTCOMES:

Upon successful completion of the course, student will be able to:
1. Understand the basic concepts of mechanical and electromechanical sensors, their electrical characteristics.
2. Understand/Analyze various capacitor sensors, ultrasonicsensors their electrical characteristics.
3. Analyze various thermal sensors, principle of operation.
4. Distinguish various magnetic sensors based on theiroperations, radiation sensors and their operation.
5. Analyze various film sensors and operation of different nano sensors and their applications.

(A30258) BASICS OF POWER ELECTRONICS & DRIVES
(Open Elective: Offered by EEE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT I: POWER SEMICONDUCTOR DEVICES
Power Semiconductor Devices Construction and Characteristics of Power diodes, Power Transistors, Power MOSFET, Insulated Gate Bipolar transistors (IGBTs) Introduction to Thyristor family: SCR, DIACs, TRIACs

UNIT II: PHASE CONTROLLED (AC TO DC) CONVERTERS
Principle of phase controlled converter operation; Operation of 1-phase half wave converter with R, RL and RLE load; 1- phase full wave converter, Bridge Configuration; Operation with R, RL, RLE load; Operation of 1-phase Semi-converter/ Half controlled converter:

UNIT III: THREE -PHASE CONVERTERS
Operation of half wave converter; Full wave fully controlled converters: Semi-controlled converter; Dual Converter: Principle and operation;, Applications of AC-DC converters

UNIT IV: DC TO DC CONVERTERS
The chopper, Basic principle of DC chopper, Classification of DC choppers, Control strategies Basic DC-DC converter (switch regulator) topologies : Principle, operation Step-down (Buck), Step-up (Boost), Step up/down (Buck-Boost), Continuous conduction and Discontinuous conduction operation, Two zone operation, Four quadrant operation (Operating modes),

UNIT V: POWER CONVERTERS FED DRIVES
Single phase separately excited drives: Half Wave converter, Semiconverter and Fully Controlled converter based drives; Braking operation of separately excited drive Semi-converter and Fully Controlled converter based drives 3-phase separately excited drives: Half Wave converter, Semi-converter and Fully Controlled converter based drives; Principle of power control (motoring control) of separately excited and series motor with DC-DC Converter;

Text books:

1. M D Singh and K B Khanchandani, "Power electronics", TMH, New Delhi.
2. P.S. Bimbhra, "Power Electronics", Khanna Publishers, New Delhi,
3. Muhammad H. Rashid, "Power Electronics - Circuits, Devices and Applications", Prentice Hall of India,

Reference Books:

1. VedamSubramanyam, "Power Electronics – Devices, Converters and Applications", New Age International Publishers Pvt. Ltd., Bangalore.
2. Ned Mohan, Undeland and Robbins, "Power Electronics – Converters, Applications and Design", John Willey & sons, Inc.,.
3. V.R.Moorthi, "Power Electronics", Oxford University press,.
4. G..K. Dubey, S.R. Doradla, A. Joshi, and R.M.K. Sinha, "Thyristorised Power Controllers", New Age International Ltd. Publishers,
5. P.T. Krein, "Elements of Power Electronics", Oxford University Press,.
6. G..K. Dubey, " Fundamentals of Electrical Drives", Narosa Publishing House, New Delhi,

Course Outcomes:

Upon successful completion of the course, student will be able to:

1. Explain the construction and characteristics of Power semiconductor devices
2. Analyze the operation of single phase and three phase ac-to-dc converters.
3. Compare the various types of dc-to-dc converters.
4. Apply the knowledge of power electronic converter for various applications.

(A30252) POWER GENERATION SYSTEMS
(Open Elective: Offered by EEE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT I: THERMAL POWER PLANTS

Rankine cycle - improvisations, Layout of modern coal power plant, Super Critical Boilers,FBCBoilers,Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants - Fuel and ash handling, Draught system, Feed water treatment. Binary Cycles and Cogeneration systems.

UNIT II: NUCLEAR POWER PLANTS

Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors: Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANada-Deuterium-Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors.Safety measures for Nuclear Power plants.

UNIT III: SOLAR ENERGY

Principles of solar radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, instruments for measuring solar radiation and sun shine, solar radiation data. Photo-voltaic energy conversion.

Solar energy collection: Flat plate and concentrating collectors

Storage and applications: solar ponds. Solar Applications - solar heating/cooling technique, solar distillation and drying.

UNIT-IV: WIND&BIO-MASS ENERGY:

Wind: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

Bio-mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT-V: GEOTHERMAL &OCEAN ENERGY:

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.
Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

TEXT BOOKS:

1. Nag. P.K., "Power Plant Engineering",, Tata McGraw – Hill Publishing Company Ltd..
2. Non-Conventional Energy Sources /G.D. Rai
3. Renewable Energy Technologies /Ramesh & Kumar /Narosa.

REFERENCES:

1. El-Wakil. M.M., "Power Plant Technology", Tata McGraw – Hill Publishing Company Ltd..
2. Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in association with the Open University,.
3. Thomas C. Elliott, Kao Chen and Robert C. Swanekamp, "Power Plant Engineering", Standard Handbook of McGraw – Hill,
4. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
5. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
6. Solar Energy /Sukhame

Course Outcomes:

Upon successful completion of the course, student will be able to:

1. Explain the construction and operation of thermal power plants
2. Analyze the operation of diesel, gas turbine and combined cycle power plants.
3. Illustrate the construction, operation and safety aspects of nuclear power plants.
4. Compare the power derived from renewable energy sources
5. Identify the economic aspects of power plants

(A30259) ELECTRICAL & HYBRID VEHICLES
(Open Elective: Offered by EEE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT I: INTRODUCTION TO HEV

Configuration of Electric Vehicles, Performance of Electric Vehicles, Traction motor characteristics, Tractive effort and Transmission requirement, Vehicle performance, Tractive effort in normal driving, Energy consumption Concept of Hybrid Electric Drive Trains, Architecture of Hybrid Electric Drive Trains, Series Hybrid Electric Drive Trains, Parallel hybrid electric drive trains

UNIT II: ENERGY STORAGE FOR EV AND HEV

Energy storage requirements, Battery parameters, Types of Batteries, Modelling of Battery, Fuel Cell basic principle and operation, Types of Fuel Cells, PEMFC and its operation, Modelling of PEMFC, Super Capacitors

UNIT III: ELECTRIC PROPULSION

EV consideration, DC motor drives and speed control, Induction motor drives, Permanent Magnet Motor Drives, Switch Reluctance Motor Drive for Electric Vehicles, Configuration and control of Drives.

UNIT IV: DESIGN OF ELECTRIC AND HYBRID ELECTRIC VEHICLES

Series Hybrid Electric Drive Train Design: Operating patterns, control strategies, Sizing of major components, power rating of traction motor, power rating of engine/generator, design of PPS Parallel Hybrid Electric Drive Train Design: Control strategies of parallel hybrid drive train, design of engine power capacity, design of electric motor drive capacity, transmission design, energy storage design

UNIT V: POWER ELECTRONIC CONVERTER FOR BATTERY CHARGING

Charging methods for battery, Termination methods, charging from grid, The Z-converter, Isolated bidirectional DC-DC converter, Design of Z converter for battery charging, High-frequency transformer based isolated charger topology, Transformer less topology

Text books:

1. M. Ehsani, Y. Gao, S. Gay and Ali Emadi, Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, CRC Press, 2005
2. Iqbal Husain, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003

Reference Books:

1. Sheldon S. Williamson, Energy Management Strategies for Electric and Plug-in Hybrid Electric Vehicles, Springer.
2. C.C. Chan and K.T. Chau, Modern Electric Vehicle Technology, OXFORD University Press.
3. Chris Mi, M. Abul Masrur, David Wenzhong Gao, Hybrid Electric Vehicles Principles and Applications With Practical Perspectives, Wiley Publication.

List of Open Source Software/learning website:

E-materials available at the website of NPTEL-
http://nptel.ac.in/MATLAB (Trial version): Software is useful for simulation and analysis of electrical systems

Course Outcomes:

Upon successful completion of the course, student will be able to:

1. Demonstrate the working of Electric Vehicles and recent trends
2. Analyze different power converter topology used for electric vehicle application
3. Develop the electric propulsion unit and its control for application of electric vehicles

(A30260) ELECTRICAL SAFETY
(Open Elective: Offered by EEE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT I: CONCEPTS AND STATUTORY REQUIREMENTS

Introduction – electrostatics, electro magnetism, stored energy, energy radiation and electromagnetic interference – Working principles of electrical equipment-Indian electricity act and rules-statutory requirements from electrical inspectorate-international standards on electrical safety – first aid-cardio pulmonary resuscitation (CPR).

UNIT II : ELECTRICAL HAZARDS

Primary and secondary hazards-shocks, burns, scalds, falls-human safety in the use of electricity. Energy leakage-clearances and insulation-classes of insulation-voltage classifications-excess energy current surges-Safety in handling of war equipments-over current and short circuit current-heating effects of current-electromagnetic forces-corona effect-static electricity –definition, sources, hazardous conditions, control, electrical causes of fire and explosion-ionization, spark and arc ignition energy-national electrical safety code ANSI. Lightning, hazards, lightning arrestor, installation – earthing, specifications, earth resistance, earth pit maintenance.

UNIT III: PROTECTION SYSTEMS

Fuse, circuit breakers and overload relays – protection against over voltage and under voltage – safe limits of amperage – voltage –safe distance from lines-capacity and protection of conductor-joints-and connections, overload and short circuit protection-no load protection-earth fault protection. FRLS insulation-insulation and continuity test-system grounding-equipment grounding-earth leakage circuit breaker (ELCB)-cable wires-maintenance of ground-ground fault circuit interrupter-use of low voltage-electrical guards-Personal protective equipment – safety in handling hand held electrical appliances tools and medical equipments.

UNIT IV SELECTION, INSTALLATION, OPERATION AND

MAINTENANCE

Role of environment in selection-safety aspects in application - protection and interlock-self diagnostic features and fail-safe concepts-lock out and work permit system-discharge rod and earthing devices safety in the use of portable tools-cabling and cable joints-preventive maintenance.

UNIT V HAZARDOUS ZONES

Classification of hazardous zones-intrinsically safe and explosion proof electrical apparatus-increase safe equipment-their selection for different zones-temperature classification-grouping of gases-use of barriers and isolators-equipment certifying agencies.

REFERENCES

1. Accident prevention manual for industrial operations", N.S.C., Chicago.
2. Indian Electricity Act and Rules, Government of India.
3. Power Engineers – Handbook of TNEB, Chennai,.
4. Martin Glov Electrostatic Hazards in powder handling, Research Studies Pvt. Ltd., England.
5. Fordham Cooper, W., "Electrical Safety Engineering" Butterworth and Company, London,.

(A30253) FUEL CELL TECHNOLOGY
(Open Elective: offered by EEE Department)

B. Tech. (CE)

UNIT I: INTRODUCTION TO FUEL CELLS

Introduction – working and types of fuel cell – low, medium and high temperature fuel cell, liquid and methanol types, proton exchange membrane fuel cell solid oxide, hydrogen fuel cells – thermodynamics and electrochemical kinetics of fuel cells

UNIT II: FUEL CELLS FOR AUTOMOTIVE APPLICATIONS

Fuel cells for automotive applications – technology advances in fuel cell vehicle systems – onboard hydrogen storage – liquid hydrogen and compressed hydrogen – metal hydrides, fuel cell control system – alkaline fuel cell – road map to market.

UNIT III: FUEL CELL COMPONENTS AND THEIR IMPACT ON PERFORMANCE

Fuel cell performance characteristics – current/voltage, voltage efficiency and power density, ohmic resistance, kinetic performance, mass transfer effects – membrane electrode assembly components, fuel cell stack, bi-polar plate, humidifiers and cooling plates.

UNIT IV: HYDROGEN STORAGE TECHNOLOGY

Hydrogen storage technology – pressure cylinders, liquid hydrogen, metal hydrides, carbon fibers – reformer technology – steam reforming, partial oxidation, auto thermal reforming – CO removal, fuel cell technology based on removal like bio-mass.

UNIT V: FUEL CYCLE ANALYSIS

Fuel Cycle Analysis – application to fuel cell and other competing technologies like battery powered vehicles, SI engine fueled by natural gas and hydrogen and hybrid electric vehicle.

Reference:

1. Fuel Cells for automotive applications – professional engineering publishing UK.

2. Fuel Cell Technology Handbook SAE International Gregor Hoogers CRC Press.

Course Outcome:

Upon successful completion of the course, student will be able to:

1. Demonstrate the working of various types of fuel cells.
2. Make use of the fuel cell for automotive applications.
3. Compare the fuel cell performance characteristics.
4. Explain the concept of hydrogen storage systems
5. Analyze the fuel cycle.

(A30255) ENERGY EFFICIENCY IN ELECTRICAL UTILITIES
(Open Elective: Offered by EEE Department)

B. Tech. (CE)

L	T	P	C
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Course Objectives: The objective of this course is to gain knowledge on energy efficient technologies for electrical systems and choose the appropriate energy efficient method for lighting, fanning, and pumping, cooling, compressed air and refrigeration systems.

UNIT I: ELECTRICAL SYSTEMS & ELECTRIC MOTORS

Introduction of Electrical systems, Tariff and economic considerations; T & D losses, Electrical load management; Maximum demand management, Role of Power factor and its improvement- Electric Power systems analysis -Energy Efficient Technologies in Electrical Systems - Motor Types, Characteristics, Efficiency - Energy Efficient Motors - Factors affecting Energy efficiency of a motor - Soft starters, Variable speed drives

UNIT II: COMPRESSED AIR SYSTEMS &HVAC

Introduction, Compressor types and performance; Compressed air syste ms components;Efficient operation of compressed air systems, Systems capacity assessment ,Energy conservation opportunities

UNIT III: REFRIGERATION SYSTEMS.

Introduction: Types of Refrigeration systems; Common Refrigerant and Properties compressor types and applications ,Performance assessmen t of Refrigeration plants ,Energy conservation opportunities.

UNIT IV: FANS, PUMPING SYSTEMS AND COOLING TOWERS

Types, Performance evaluation, efficient system operation, Capacity selections - Performance assessment of fans and blowers - Energy conservation opportunities

Types, Performance evaluation, efficient system operation - Energy conservation opportunities in pumping systems - Introduction to cooling towers; cooling tower performance, efficient system operation- Energy conservation opportunities in cooling towers.

UNIT V: LIGHTING SYSTEMS

Basic terms of lighting systems; Lamp and Luminaries types, recommended illumination level-Methodology of lighting systems energy efficiency study - Cast study, Energy conservation opportunities

Text Books

1. Capehart, Turner, Kennedy. Guide to Energy Management. The Fairmount Press.
2. Thumann, Younger. Handbook of Energy AuditThe Fairmount Press.
3. Thumann, Mehta. Handbook of Energy Engineering. The Fairmo unt Press,

References Books (DRE 201, 202 and 203)

1. General Aspect of Energy Management and Energy Audit, BEE Guide book
2. Energy Efficiency in Thermal Utilities, BEE guide book
3. Energy Efficiency in Electrical Utilities, BEE guide book
4. Turner WC, Energy Management Hand Book, The Fairmont Press

Course Outcomes:

Upon successful completion of the course, student will be able to:

1. Explain the energy efficient technologies meant for electrical systems
2. Choose the appropriate energy efficient method for lighting, fanning, pumping, cooling, compressed air and refrigeration systems.

(A30256) ENERGY AUDIT & CONSERVATION
(Open Elective: Offered by EEE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT I: Basic Principles of Energy Audit

Energy audit- definitions, concept , types of audit, energy index, cost index,pie charts, Sankey diagrams, load profiles, Energy conservation schemes- Energy audit of industries- energy saving potential, energy audit of process industry, thermal power station, building energy audit.

UNIT II: Energy Management

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting- Energy manger, Qualities and functions, language, Questionnaire – check list for top management.

UNIT III: Energy Efficient Motors

Energy efficient motors, factors affecting efficiency, loss distribution, constructional details, characteristics – variable speed, variable duty cycle systems, RMS hp- voltage variation-voltage unbalance- over motoring- motor energy audit

UNIT IV: Power Factor Improvement, Lighting and Energy Instruments

Power factor – methods of improvement, location of capacitors, pf with non-linear loads, effect of harmonics on power factor, power factor motor controllers – Good lighting system design and practice, lighting control, lighting energy audit – Energy Instruments-wattmeter, data loggers, thermocouples, pyrometers, lux meters, tongue testers ,application of PLC's.

UNIT V: Economic Aspects and Analysis

Economics Analysis-Depreciation Methods, time value of money, rate of return , present worth method , replacement analysis, life cycle costing analysis- Energy efficient motors- calculation of simple payback method, net present worth method- Power factor correction, lighting – Applications of life cycle costing analysis,

return on investment .

TEXT BOOKS:

1. Energy management by W.R. Murphy AND G. Mckay Butter worth, Heinemann publications.
2. Energy management by Paul o' Callaghan, Mc-graw Hill Book company-1st edition,

REFERENCES:

1. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd
2. Energy management hand book by W.C.Turner, John wiley and sons
3. Energy management and good lighting practice : fuel efficiency-booklet 12-EEO

Course Outcomes

Upon successful completion of the course, student will be able to:

1. Explain the various methods of energy audit.
2. Illustrate the energy management strategies.
3. Relate the energy conservation with the improvement in energy efficiency and power factor.
4. Analyze the economic aspects to be considered in energy usage

(A30257) NANO TECHNOLOGY
(Open Elective: Offered by EEE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT I: NTRODUCTION

History and Scope, Can Small Things Make a Big Difference? Classification of Nanostructured Materials, Fascinating Nanostructures, Applications of Nanomaterials, Nature: The Best of Nanotechnologist, Challenges, and Future Prospects.

UNIT II: UNIQUE PROPERTIES OF NANOMATERIALS

Microstructure and Defects in Nanocrystalline Materials: Dislocations, Twins, stacking faults and voids, Grain Boundaries, triple and declinations, Effect of Nano-dimensions on Materials Behavior: Elastic properties, Melting Point, Diffusivity, Grain growth characteristics, enhanced solid solubility. Magnetic Properties: Soft magnetic nano crystalline alloy, Permanent magnetic nano-crystalline materials, Giant Magnetic Resonance, Electrical Properties, Optical Properties, Thermal Properties, and Mechanical Properties.

UNIT III: SYNTHESIS ROUTES

Bottom up approaches: Physical Vapor Deposition, Inert Gas Condensation, Laser Ablation, Chemical Vapor Deposition, Molecular Beam Epitaxy, Solgel method, Self-assembly, Top down approaches: Mechanical alloying, Nano-lithography, Consolidation of Nanopowders: Shock wave consolidation, Hot isostatic pressing and Cold isostatic pressing, Spark plasma sintering.

UNIT IV: TOOLS TO CHARACTERIZE NANO MATERIALS

X-Ray Diffraction (XRD), Small Angle X-ray scattering (SAXS), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Scanning Tunneling Microscope (STM), Field Ion Microscope (FEM), Three-

dimensional Atom Probe (3DAP), Nanoindentation.

UNIT V: APPLICATIONS OF NANOMATERIALS

Nano-electronics, Micro- and Nano-electromechanical systems (MEMS/NEMS), Nanosensors, Nanocatalysts, Food and Agricultural Industry, Cosmetic and Consumer Goods, Structure and Engineering, Automotive Industry, WaterTreatment and the environment, Nano-medical applications, Textiles, Paints, Energy, Défense and Space Applications, Concerns and challenges of Nanotechnology.

TEXT BOOKS:

1. Text Book of Nano Science and Nano Technology – B.S. Murthy, P. Shankar, Baldev Raj, B.B. Rath and James Munday, University Press-IIM.
2. Introduction to Nanotechnology – Charles P. Poole, Jr., and Frank J. Owens, Wiley India Edition.

REFERENCES BOOKS:

1. Nano: The Essentials by T. Pradeep, Mc Graw- Hill Education.
2. Nanomaterials, Nanotechnologies and Design by Michael F. Ashby, Paulo J. Ferreira and Daniel L. Schodek.
3. Transport in Nano structures- David Ferry, Cambridge University press
4. Nanofabrication towards biomedical application: Techniques, tools, Application and impact – Ed. Challa S., S. R. Kumar, J. H. Carola.
5. Carbon Nanotubes: Properties and Applications- Michael J. O'Connell.
6. Electron Transport in Mesoscopic systems - S. Dutta, Cambridge University press

Course Outcomes

Upon successful completion of the course, student will be able to:

1. Illustrate the characteristics and properties of nano-materials.
2. Identify the synthesis routes of nano-materials
3. Make use of the tools to characterize the nano-materials.
4. Utilize the nano-materials for various applications.

(A30383) FUNDAMENTALS OF ENGINEERING MATERIALS
(Open Elective: Offered by Mechanical Engineerng Department)

B. Tech (CE)

L	T	P	C
3	0	0	3

UNIT – I

Structure of Metals: Crystallography, Miller's indices, Packing Efficiency, Density calculations. Grains and Grain Boundaries. Effect of grain size on the properties. Determination of grain size by different methods. Constitution of Alloys: Necessity of alloying, Types of solid solutions, Hume - Rothery rules, Intermediate alloy phases.

UNIT –II

Phase Diagrams: Construction and interpretation of phase diagrams, Phase rule. Lever rule. Binary phase Diagrams, Isomorphous, Eutectic and Eutectoid transformations with examples.

UNIT – III

Steels: Iron-Carbon Phase Diagram and Heat Treatment: Study of Fe-Fe3C phase diagram. Construction of TTT diagrams. Annealing, Normalizing, Hardening and Tempering of steels, Hardenability. Alloy steels.

UNIT – IV

Cast Irons: Structure and properties of White Cast iron, Malleable Cast iron, Grey cast iron. Engineering Materials-III: Non-ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminium and its alloys, Al-Cu phase diagram, Titanium and its alloys.

UNIT – V

Ceramics, Polymers and Composites: Crystalline ceramics, glasses, cermets: structure, properties and applications. Classification, properties and applications of composites. Classification, Properties and applications of Polymers.

TEXT BOOKS:

1. Material Science and Metallurgy/ Kodgire
2. Essentials of Materials Science and engineering / Donald R. Askeland / Thomson.

REFERENCE BOOKS:

1. Introduction to Physical Metallurgy / Sidney H. Avner.
2. Materials Science and engineering / William and callister.
3. Elements of Material science / V. Rahghavan

Course Outcomes:

At the end of the course the students are able to:

1. Identify the crystalline structure of steel.
2. Understand the theory of time temperature and transformation
3. Determine of different uses of heat treatment in steel.
4. Distinguish between the various forms of steel.
5. Understand the properties of non-ferrous alloys and uses of composite materials.

(A30377) BASICS OF THERMODYNAMICS
(Open Elective: Offered by Mechanical Engineering Department)

B. Tech (CE)

L	T	P	C
3	0	0	3

UNIT – I

Introduction: Basic Concepts: System, Control Volume, Surrounding, Boundaries, universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Exact & Inexact Differentials, Cycle, Reversibility – Quasi – static Process, Irreversible Process, Causes of Irreversibility.

UNIT - II

Types, Displacement & Other forms of Work, Heat, Point and Path functions, Zeroth Law of Thermodynamics – Concept of Temperature – Principles of Thermometry – Reference Points – Const. Volume gas Thermometer – Scales of Temperature, Ideal Gas Scale.

UNIT – III

First and Second Laws of Thermodynamics: First Law: Cycle and Process, Specific Heats (cpand cv), Heat interactions in a Closed System for various processes, Limitations of First Law,Concept of Heat Engine (H.E.) and Reversed H.E. (Heat Pump and Refrigerator), Efficiency/COP, Second Law: Kelvin-Planck and Clausius Statements, Carnot Cycle, Carnot Efficiency, Statement of Clausius Inequality, Property of Entropy, T-S and P-V Diagrams

UNIT - IV

Mixtures of perfect Gases – Mole Fraction, Mass friction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction, Volume fraction and partial pressure, Equivalent Gas const.

Atmospheric air - Psychrometric Properties – Dry bulb Temperature, Wet BulbTemperature, Dew point Temperature, , Specific Humidity, Relative Humidity, saturated Air, Vapour pressure, Degree of saturation – Adiabatic Saturation ,Psychrometric chart

UNIT - V

Power Cycles: Otto, Diesel cycles - Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis

Refrigeration Cycles: Bell-Coleman cycle, Vapour compression cycle-performance Evaluation.

TEXT BOOKS:

1. Basic Engineering Thermodynamics / PK Nag / Mc Graw Hill
2. Engineering Thermodynamics / chattopadhyay/ Oxford

REFERENCE BOOKS:

1. Thermodynamics for Engineers / Kenneth A. Kroos, Merle C. Potter/ Cengage
2. Thermodynamics /G.C. Gupta /Pearson

COURSE OUTCOMES:

After completing this course, the students will be able to

1. Apply energy balance to systems and control volumes, in situations involving heat and work interactions.
2. Evaluate changes in thermometric properties of substances.
3. Apply the laws of thermodynamics to different systems.
4. Understand the psychrometric properties of air
5. Compare differ**e**nt air standard cycles.

(A30357) FUNDAMENTALS OF MANUFACTURING PROCESSES

(Open Elective: Offered by Mechanical Engineerng Department)

B. Tech (CE)	**L**	**T**	**P**	**C**
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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.

UNIT – II

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 – III

Hot working, cold working, strain hardening, recovery, recrystallisation, 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 – IV

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

UNIT – V

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 / Mc Graw Hill
2. Manufacturing Engineering and Technology/Kalpakjin S/ Pearson.

REFERENCE BOOKS:

1. Metal Casting / T.V Ramana Rao / New Age
2. Métal Fabrication Technology/ Mukherjee/PHI

Course Outcomes:

For given product, one should be able identify the manufacturing process.

1. Understand the idea for selecting materials for patterns.
2. Learn different types and allowances of patterns used in casting and analyze the components of moulds.
3. Design core, core print and gating system in metal casting processes 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.

A30379) FUNDAMENTALS OF AUTOMOBILE ENGINEERING
(Open Elective: Offered by Mechanical Engineering Department)

B. Tech (CE)

L	T	P	C
3	0	0	3

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, re boring, decarburization

Unit – II

Fuel System: S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pumps – Carburetor – types – air filters – petrol injection.

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.

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.

Unit – III

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.

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

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.

Steering System: Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism

Unit-V 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

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. Rami Reddy, Frontline publications.

Course outcomes:

By undergoing this course, a student shall be able to

1. Identify power generation, transmission and control mechanisms in an automobile
2. Manipulate the chemical, thermal, mechanical and electrical energies in an automobile
3. Infer the interaction between subsystems
4. Analyze how transmission system works
5. Learn different components of suspension systems.

(A30382) FUNDAMENTALS OF MECHANICAL ENGINEERING
(Open Elective: Offered by Mechanical Engineering Department)

B. Tech (CE)

L	T	P	C
3	0	0	3

UNIT - I

Introduction: Prime movers and its types, Concept of Force, Pressure, Energy, Work, Power, System, Heat, Temperature, Specific heat capacity, Change of state, Path, Process, Cycle, Internal energy, Enthalpy, Statements of Zeroth Law and First law.

Energy: Introduction and applications of Energy sources like Fossil fuels, Nuclear fuels, Hydel, Solar, wind, and bio-fuels, Environmental issues like Global warming and Ozone depletion.

UNIT - II

Properties of gases: Gas laws, Boyle's law, Charle's law, Combined gas law, Gas constant, Relation between Cp and Cv, Various non-flow processes like constant volume process, constant pressure process, Isothermal process, Adiabatic process, Poly-tropic process

Properties of Steam: Steam formation, Types of Steam, Enthalpy, Specific volume, Internal energy and dryness fraction of steam, use of Steam tables, steam calorimeters.

Steam Boilers: Introduction, Classification, Cochran, Lancashire and Babcock and Wilcox boiler, functioning of different mountings and accessories.

UNIT - III

Heat Engines: Heat Engine cycle and Heat Engine, working substances, Classification of heat engines, Description and thermal efficiency of Carnot; Rankine; Otto cycle and Diesel cycles.

Internal Combustion Engines: Introduction, Classification, Engine details, four- stroke/ two-stroke cycle Petrol/Diesel engines, indicated power, Brake Power, Efficiencies.

UNIT - IV

Pumps: Types and operation of Reciprocating, Rotary and

Centrifugal pumps, Priming Air Compressors: Types and operation of Reciprocating and Rotary air compressors, significance of Multistage.

Refrigeration & Air Conditioning: Refrigerant, Vapor compression refrigeration system, vapor absorption refrigeration system, Domestic Refrigerator, Window and split air conditioners.

UNIT - V

Couplings, Clutches and Brakes: Construction and applications of Couplings (Box; Flange; Pin type flexible; Universal and Oldham), Clutches (Disc and Centrifugal), and Brakes (Block; Shoe; Band and Disc).

Transmission of Motion and Power: Shaft and axle, Belt drive, Chain drive, Friction drive, Gear drive.

TEXT BOOKS:

1.Basic Mechanical Engineering / Pravin Kumar/ Pearson 2. Introduction to Engineering Materials / B.K. Agrawal/ Mc Graw Hill

REFERENCE BOOKS:

1. Fundamental of Mechanical Engineering/ G.S. Sawhney/PHI
2. Thermal Science and Engineering / Dr. D.S. Kumar/ Kataria

Course outcomes:

By undergoing this course, a student shall be able to

1. Understand different types of fuels.
2. Explain properties of steam
3. Understand the working Principle of IC Engines.
4. Explain the operations of types of pumps.
5. Know the application of mechanical drives in Transmission of Power.

(A30378) WASTE TO ENERGY
(Open Elective: Offered by Mechanical Engineering Department)

B. Tech (CE)

L	T	P	C
3	0	0	3

Unit-I:

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Unit-II:

Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods – Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit-III:

Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers –Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Unit-IV:

Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Unit-V:

Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion – Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

TEXT BOOKS:

1. Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.

REFERENCE BOOKS:

1. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
2. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons,1996.

Course Outcomes:

By undergoing this course, a student shall be able to

1. Understand different Conversion Devices.
2. Explain Biomass Pyrolysis.
3. Understand the working Principle of biomass gasification
4. Explain Biomass Combustion.
5. Know the application of Bio Gas.

(A30358) INDUSTRIAL SAFETY ENGINEERING
(Open Elective: Offered by Mechanical Engineering Department)

B. Tech (CE)

L	T	P	C
3	0	0	3

UNIT-I:

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

UNIT-II:

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT-III:

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT-IV:

Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault-finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

UNIT-V:

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

TEXT BOOKS

1. Mobley, R. Keith, Lindley R. Higgins, and Darrin J. Wikoff. *Maintenance Engineering Handbook*. New York, NY: Mcgraw-Hill, 2008.
2. Garg, H. P. *Industrial Maintenance*. S Chand, 1976.

REFERENCE BOOKS:

1. Graham, F. D. "Audels Pumps, Hydraulics and Air Compressors. Theo." (1998).
2. Winterkorn, Hans F., and Hsai-Yang Fang. *Foundation engineering handbook*. Springer, Boston, MA, 1991.

Course Outcomes:

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

1. Understand various hazards and their prevention.
2. Apply maintenance techniques to various equipment.
3. Understand types of wear and corrosions and their prevention.
4. Explain fault tracing and its applications.
5. Apply periodic and preventive maintenance techniques to various equipment.

(A30360) WORK SYSTEM DESIGN
(Open Elective: Offered by Mechanical Engineering Department)

B. Tech. CE)

L	T	P	C
3	0	0	3

Unit-I

Work System Design: Introduction and Concept of Productivity, Measurement of Productivity, Productivity Measures, Productivity Measurement Models, Factors Influencing Productivity, Causes of Low Productivity, Productivity Measurement Models, Productivity Improvement Techniques, and Numerical Problems on productivity, Case study on productivity.

Unit-II

Work Study: Basic Concept, Steps Involved in Work Study, Concept of Work Content, Techniques of Work Study, Human Aspects of Work Study.

Method Study: Basic Concept, Steps Involved in Method Study, Recording Techniques, Operation Process Charts, And Operation Process Charts: Examples.

Flow Process Charts, Flow Process Charts: Examples, Two-Handed-Process Charts, Multiple Activity Charts, Flow Diagrams.

Unit-III

String Diagrams, Principles of Motion Economy, Micro-Motion Study, Therbligs, SIMO Charts, Memo-Motion Study, Cycle graph and Chrono-Cycle Graph, Critical Examination Techniques, Development and Selection of New Method, Installation and Maintenance of Improved Methods.

Unit-IV

Work Measurement: Basic Concept, Techniques of Work Measurement, Steps Involved in Time Study, Steps and Equipment of Time Study, Performance Rating: Examples, Allowances, Computation of Standard Time-I, Computation of Standard Time-II, Case Study

Unit-V

Work Sampling: Basics, Procedure of Work Sampling Study, and Numerical Problems on work sampling, Introduction to Synthetic Data

and PMTS, Introduction to MTM and MOST
Ergonomics: Basic Concept, Industrial Ergonomics, Anthropometry, Man-Machine System-1, Man-Machine System-2

TEXT BOOKS:

1. Introduction to Work Study: International Labor Office (ILO), Geneva.

2. Motion and Time Study Design and Measurement of Work: Ralph M. Barnes, Wiley, The University of California.

3. Industrial Engineering and Production Management: M. Telsang, S. Chand and Company Ltd.

Course Outcomes:
At the end of the course, the student should be able to

1. Calculate the basic work content of a specific job for employees of an organization. Thereby they will be able to calculate the production capacity of man power of an organization.
2. Analyze and calculate the level of risk in a job causing stress, fatigue and musculoskeletal disorders and design appropriate work systems.
3. Rate a worker engaged on a live job and calculate basic, allowed and standard time for the same.
4. Analyze the existing methods of working for a particular job and develop an improved method through questioning technique.
5. devise appropriate wage and incentive plan for the employees

(A30160) DISASTER MANAGEMENT AND MITIGATION
(Open Elective: Offered by CE Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT - I:

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical reserches.

UNIT - II:

Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man induced hazards & Disasters - Natural Hazards - Planetary Hazards / Disasters - Extra Planetary Hazards / disasters - Planetary Hazards - Endogenous Hazards - Exogenous Hazards

UNIT - III:

Endogenous Hazards - Volcanic eruption - Earthquakes - landslides - Volcanic Hazards / Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards / disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - Human adjusment, perception & mitigation of earthquake.

UNIT - IV:

Exogenous hazards / disasters - Infrequent events - Cumulative atmospheric hazards / disasters

Infrequent events: Cyclones - Lightning - Hailstorms

Cyclones: Tropical cyclones & Local stroms - Destruction by tropical cyclones & local stroms (causes, distribution human adjustment,

perception & mitigation) Cumulative atmospheric hazards/ disasters :- Floods - Droughts - Cold waves - Heat waves,
Floods :- Causes of floods - Flood hazards India - Flood control measures (Human adjustment, perception & mitigation) Droughts :- Impacts of droughts - Drought hazards in India - Drought control measures - Extra Planetary Hazards / Disasters - man induced Hazards / Disasters - Physical hazards / Disasters - Soil erosion
Soil Erosion: Mechanics & forms of Soil Erosion - Factors 7 causes of Soil Erosion - Conservation measures of Soil Erosion.

Chemical hazards / disasters: Release of toxic chemicals, nuclear explosion - Sedimentation processes: - Global Sedimentation problems - Regional Sedimentation problems - Sedimentation & Environmental problems - Corrective measures of Erosion & Sedimentation

Biological hazards / disasters: Population Explosion.

UNIT - V:
Emerging approaches in Disaster Management - Three stages
Pre-disaster Stage (preparedness)
Emergency Stage
Post Disaster stage - Rehabilitation

TEXT BOOKS:

1. Manual on Disaster Management, National Disaster Management, Agency Govt of India.
2. Disaster Management by Mrinalini Pandey Wiley.
3. Disaster Science and Management by T. Bhattacharya, McGraw Hill Education (India) Pvt Ltd Wiley

REFERENCES:

1. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BS Publications.National Disaster Management Plan, Ministry of Home affairs,GoI (http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf)

Course outcomes

1. Explain the Environmental Hazards & Disasters
2. Discuss about Types of Environmental hazards & Disasters
3. Explain the Endogenous Hazards Exogenous hazards
4. Apply Emerging approaches in Disaster Management

(A30161) REMOTE SENSING AND GIS
(Open Elective: Offered by Civil Engineering Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT – I

Introduction to Photogrammetric: Principles& types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducial points, parallax measurement using fiducial line.

UNIT – II

Remote Sensing: Basic concept of remote sensing, Data and Information, Remote sensing data Collection, Remote sensing advantages & Limitations, Remote Sensing process. Electro-magnetic Spectrum, Energy interactions with atmosphere and with earth surface features (soil, water, vegetation), Indian Satellites and Sensors characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.

UNIT – III

Geographic Information Systems: Introduction to GIS; Components of a GIS; Geospatial Data: Spatial Data-Attribute data – Joining Spatial and Attribute data; GIS Operations: Spatial Data Input-Attribute data Management –Data display- Data Exploration- Data Analysis. COORDINATE SYSTEMS: Geographic Coordinate System: Approximation of the Earth, Datum; Map Projections: Types of Map Projections-Map projection parameters commonly used Map Projections - Projected coordinate Systems

UNIT – IV

Vector Data Model: Representation of simple features- Topology and its importance; coverage and its data structure, Shape file; Data models for composite features Object Based Vector Data Model; Classes and their Relationship; The geo-base data model; Geometric

representation of Spatial Feature and data structure, Topology rules

UNIT – V

Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster DataStructure, Data Conversion, Integration of Raster and Vector data.

Data Input: Metadata, Conversion of Existing data, creating new data; Remote Sensing data,Field data, Text data, Digitizing, Scanning, on screen digitizing, importance of source map,Data Editing.

TEXT BOOKS:

1. Remote Sensing and GIS Lillesand and Kiefer, John Willey.
2. Remote Sensing and GIS B. Bhatta by Oxford Publishers.
3. Introduction to Geographic Information System – Kang-Tsung Chang, McGraw-Hill

REFERENCES:

1. Concepts & Techniques of GIS by C. P. Lo Albert, K.W. Yonng, Prentice Hall (India)Publications.
2. Principals of Geo physical Information Systems – Peter A Burragh and Rachael A.Mc Donnell, Oxford Publishers.
3. Basics of Remote sensing & GIS by S. Kumar, Laxmi Publications.

Course Outcomes:

Upon successful completion of the course, student will be able to:

1. Retrieve the information content of remotely sensed data
2. Analyze the energy interactions in the atmosphere and earth surface features
3. Interpret the images for preparation of thematic maps
4. Apply problem specific remote sensing data for engineering applications
5. Analyze spatial and attribute data for solving spatial problems
6. Create GIS and cartographic outputs for presentation

(A30162) GREEN BUILDINGS
(Open Elective: Offered by Civil Engineering Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT I - INTRODUCTION

A historical perspective. General premises and strategies for sustainable and green design, objectives and basis. Bio-mimicry as a design tool based on ecosystem analogy.

UNIT II - GREEN CONSTRUCTION AND ENVIRONMENTAL QUALITY

Sustainable architecture and Green Building: Definition, Green building evaluation systems; LEED Certification; Green Globe Certification; Case studies which look at the environmental approach; Renewable Energy; Controlling the water cycle, Impact of materials on environment; Optimizing construction; Site management; Environmental management of buildings.

UNIT III - PASSIVE DESIGN IN MATERIALS

Passive Design and Material Choice – Traditional Building Materials – Importance of envelope
material in internal temperature control – Specification for walls and roofs in different climate –
Material and Humidity Control.

UNIT IV - ECO HOUSE

The form of the house, the building as an analogy. Building concepts: energy loss, insulation, passive solar gain, active solar gain, health benefits, and sustainable materials. Small scale wind and hydro power systems. Case study of eco house.

UNIT V - SUSTAINABLE AND GREEN BUILDING DESIGN STUDIO

This studio will explore collaborative learning to explore, investigate and apply various parameters of sustainability for design development of projected building/ urban scenarios.

REFERENCE BOOKS:

1. Ken Yeang: Eco Design- A manual for Ecological design; Wiley Academy.
2. Sue Roaf et all: Ecohouse, A design guide; Elsevier Architectural Press,.
3. Thomas E Glavinich: Green Building Construction; Wiley,.
4. Brenda and Robert Vale: Green Architecture, Design for a Sustainable Future; Thamesand Hudson.

Course Outcomes

Upon successful completion of the course, student will be able to:

1. Explain the sustainability.
2. Define renewable energy conservation through material usage.
3. Explain the Eco House system
4. Designing green buildings.

(A30163) AIR POLLUTION AND CONTROL
(Open Elective: Offered by Civil Engineering Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT – I

Introduction: Definition, Sources, classification and characterization of air pollutants. Effects of air pollution on health, vegetation & materials. Types of inversion, photochemical smog.

UNIT – II

Meteorology: Temperature lapse rate & stability, wind velocity & turbulence, plume behavior, measurement of meteorological variables, wind rose diagrams, Plume Rise, estimation of effective stack height and mixing depths.

UNIT – III

Sampling: Sampling of particulate and gaseous pollutants (Stack, Ambient & indoor air pollution), Monitoring and analysis of air pollutants (PM2.5, PM10, SOX, NOX, CO, NH3). Development of air quality models-Gaussian dispersion model-Including Numerical problems.

UNIT – IV

Control Techniques: Particulate matter and gaseous pollutants-settling chambers, cyclone separators, scrubbers, filters & ESP - Including Numerical problems. Site selection for industrial plant location.

UNIT – V

Air pollution due to automobiles, standards and control methods. Noise pollution- causes, effects and control, noise standards. Environmental issues, global episodes. Environmental laws and acts.

Textbooks:

1. M. N. Rao and H V N Rao, “Air pollution”, Tata Mc-G raw Hill Publication.
2. H. C. Perkins, “Air pollution”. Tata McGraw Hill Publication.
3. Mackenzie Davis and David Cornwell, “Introduction to Environmental Engineering” McGraw-Hill Co.

Reference Books:

1. Noel De Nevers, "Air Pollution Control Engineering", Waveland Pr Inc.
2. Anjaneyulu Y, "Text book of Air Pollution and Control Technologies", Allied Publishers.

Course outcomes:

Upon successful completion of the course, student will be able to:

1. Identify the major sources of air pollution and understand their effects on health and environment.
2. Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models.
3. Ascertain and evaluate sampling techniques for atmospheric and stack pollutants.
4. Choose and design control techniques for particulate and gaseous emissions.

(A30164) BASICS OF CIVIL ENGINEERING
(Open Elective: Offered by Civil Engineering Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT – I

General introduction to Civil Engineering - Introduction to types of buildings, Components of a residential building, Introduction to industrial buildings; Introduction to planning of residential buildings - Simple building plans;

UNIT – II

Introduction to the various building area terms; Setting out of a building; Surveying – Principles, Objectives, Horizontal measurements with tapes, Ranging;

UNIT – III

Levelling – Instruments, Reduction of levels; Modern surveying instruments; Building materials – Bricks, cement blocks, Cement, Cement mortar, Steel;

UNIT – IV

Building construction – Foundations, Brick masonry, Roofs, Floors, Decorative finishes, Plastering, Paints and Painting;

UNIT – V

Basic infrastructure and services – Elevators, Escalators, Ramps, Air conditioning, Sound proofing, Towers, Chimneys, Water Tanks; Intelligent buildings.

References Books:

1. Chudley, R., Construction Technology, Longman Group, England
2. Chudley, R. and Greeno, R., Building Construction Handbook, Addison Wesley, Longman Group, England
3. Gopi, S., Basic Civil Engineering, Pearson Publishers
4. Kandya, A. A., Elements of Civil Engineering, Charotar Publishing house

5. Mamlouk, M. S., and Zaniewski, J. P., Materials for Civil and Construction Engineering, Pearson Publishers.

Course Outcomes:

Upon successful completion of the course, student will be able to:

1. Illustrate the fundamental aspects of Civil Engineering.
2. Plan and set out a building.
3. Explain the concepts of surveying for making horizontal and vertical measurements.
4. Illustrate the uses of various building materials and explain the method of construction of different components of a building.
5. Discuss about various services in a building.

(A30165) SUSTAINABILITY CONCEPTS IN CIVIL ENGINEERING

(Open Elective: Offered by Civil Engineering Department)

B. Tech. (CE)

L	T	P	C
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Course Objectives: This course will enable students to

- Learn about the principles, indicators and general concept of sustainability.
- Apprehend the local, regional and global impacts of unsustainable designs, products and processes.
- Student shall be able to apply the sustainability concepts in engineering
- Know built environment frame work sand their use
- Understand how building and design is judged and valued by clients and stakeholders and how to implement sustainability.

UNIT – I

Introduction: Sustainability - Introduction, Need and concept of sustainability, Social-environmental and economic sustainability concepts. Sustainable development, Nexus between Technology and Sustainable development, Challenges for Sustainable Development. Multilateral environmental agreements and Protocols - Clean Development Mechanism (CDM), Environmental legislations in India - Water Act, Air Act.

UNIT – II

Global Environmental Issue: Resource degradation, Climate change, Regional and Local Environmental Issues. Carbon credits and carbon trading, carbon foot print Carbon sequestration – Carbon capture and storage (CCS). Environmental management standards, ISO 14000 series, Life Cycle Analysis (LCA) - Scope and Goal, Bio-mimicking.

UNIT – III

Sustainable Design: Basic concepts of sustainable habitat, Green buildings, green materials for building construction, material selection for sustainable design, green building certification- GRIHA & IGBC Certification for buildings, Energy efficient building design- Passive

solar design technique, Thermal storage, Cooling strategies, high performance insulation. Sustainable cities, Sustainable transport.

UNIT – IV

Clean Technology and Energy: Energy sources: Basic concepts-Conventional and non-conventional, solar energy, Fuel cells, Wind energy, Small hydro plants, bio-fuels, Energy derived from oceans, Geothermal energy. Rainwater harvesting.

UNIT – V

Green Engineering: Green Engineering concepts, Sustainable Urbanization, industrialization and poverty reduction; Social and technological change, Industrial Processes: Material selection, Pollution Prevention, Industrial Ecology, Industrial symbiosis.

Textbooks:

1. Allen, D.T. and S honnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.
2. Bradley. A.S; Adebayo, A. O., Maria, P. Engineering applications in sustainable design and development, Cengage learning.

Reference Books:

1. Mackenthun, K. M.,Basic Concepts in Environmental Management, Lewis Publication.
2. ECBC Code 2007, Bureau of Energy Efficiency, New Delhi Bureau of Energy Efficiency PublicationsRating System, TERI Publications - GRIHA Rating System.
3. Ni bin Chang, Systems Analysis for Sustainable Engineering: Theory and Applications, McGraw-Hill Professional.
4. Twidell, J. W. and Weir, A. D., Renewable Energy Resources, English Language Book Society (ELBS).
5. Malcolm Dowden, Climate Change and Sustainable Development: Law, Policy and Practice.
6. Daniel A. Vallero and Chris Brasier, “Sustainable Design: The Science of Sustainability and Green Engineering”, Wiley-Blackwell.
7. Sustainable Engineering Practice: An Introduction, Committee on Sustainability, American Society of Civil Engineers.

Course Outcomes:
Upon successful completion of the course, student will be able to:

1. Learn the sustainability concepts; understand the role and responsibility of engineers in sustainable development.
2. Quantify sustainability, and resource availability, Rationalize the sustainability based on scientific merits.
3. Understand and apply sustainability concepts in construction practices, designs, product developments and processes across various engineering disciplines.
4. Make a decision in applying green engineering concepts and become a lifelong advocate of sustainability in society.

(A30166) ENVIRONMENTAL PROTECTION AND MANAGEMENT
(Open Elective: Offered by Civil Engineering Department)

B. Tech. (CE)

UNIT – I

Environmental Management Standards: Unique Characteristics of Environmental Problems – Systems approach to Corporate environmental management - Classification of Environmental Impact Reduction Efforts - Business Charter for Sustainable Production and Consumption – Tools, Business strategy drivers and Barriers - Evolution of Environmental Stewardship. Environmental Management Principles - National policies on environment, abatement of pollution and conservation of resources - Charter on Corporate responsibility for Environmental protection.

UNIT – II

Environmental Management Objectives: Environmental quality objectives – Rationale of Environmental standards: Concentration and Mass standards, Effluent and stream standards, Emission and ambient standards, Minimum national standards, environmental performance evaluation: Indicators, benchmarking. Pollution control Vs Pollution Prevention - Opportunities and Barriers – Cleaner production and Clean technology, closing the loops, zero discharge technologies.

UNIT – III

Environmental Management System: EMAS, ISO 14000 - EMS as per ISO 14001– benefits and barriers of EMS – Concept of continual improvement and pollution prevention - environmental policy – initial environmental review – environmental aspect and impact analysis – legal and other requirements- objectives and targets – environmental management programs – structure and responsibility – training awareness and competence- communication – documentation and document control – operational control – monitoring and measurement – management review.

UNIT – IV

Environmental Audit: Environmental management system audits as per ISO 19011- – Roles and qualifications of auditors - Environmental performance indicators and their evaluation – Non conformance – Corrective and preventive actions -compliance audits – waste audits and waste minimization planning – Environmental statement (form V) - Due diligence audit.

UNIT – V

Applications: Applications of EMS, Waste Audits and Pollution Prevention Control: Textile, Sugar, Pulp & Paper, Electroplating, , Tanning industry. Hazardous Wastes - Classification, characteristics Treatment and Disposal Methods, Transboundary movement, disposal.

Reference Books:

1. Christopher Sheldon and Mark Yoxon, "Installing Environmental management Systems – a step by step guide" Earthscan Publications Ltd, London.
2. ISO 14001/14004: Environmental management systems – Requirements and Guidelines – International Organisation for Standardisation,
3. ISO 19011: 2002, "Guidelines for quality and/or Environmental Management System auditing, Bureau of Indian Standards, New Delhi,
4. Paul L Bishop „Pollution Prevention: Fundamentals and Practice, McGraw- Hill International, Boston.
5. Environmental Management Systems: An Implementation Guide for Small and Medium-Sized Organizations, Second Edition, NSF International, Ann Arbor, Michigan.

Course outcomes:

Upon successful completion of the course, student will be able to:

1. Appreciate the elements of Corporate Environmental Management systems complying to international

environmental management system standards.

2. Lead pollution prevention assessment team and implement waste minimization options.
3. Develop, Implement, maintain and Audit Environmental Management systems for Organizations.

(A30167) ALTERNATE BUILDING MATERIALS
(Open Elective: Offered by Civil Engineering Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

UNIT – I: Introduction: Energy in building materials, Environmental issues concerned to building materials, Embodied energy and life-cycle energy, Global warming and construction industry, Green concepts in buildings, Green building ratings – IGBC and LEED manuals – mandatory requirements, Rainwater harvesting & solar passive architecture. Environmental friendly and cost effective building technologies, Requirements for buildings of different climatic regions.

UNIT – II: Elements of Structural Masonry : Elements of Structural Masonry, Masonry materials, requirements of masonry units' characteristics of bricks, stones, clay blocks, concrete blocks, stone boulders, laterite Blocks, Fal- G blocks and Stabilized mud block. Manufacture of stabilized blocks.

Structural Masonry Mortars: Mortars, cementations materials, sand, natural & manufactured, types of mortars, classification of mortars as per BIS, characteristics and requirements of mortar, selection of mortar. Uses of masonry, masonry bonding, Compressive strength of masonry elements, Factors affecting compressive strength, Strength of Prisms/wallets and walls, Effect of brick bond on strength, Bond strength of masonry: Flexure and shear, Elastic properties of masonry materials and masonry, Design of masonry compression elements subjected to axial load.

UNIT – III: Alternate Building Materials: Lime, Pozzolana cements, Raw materials, Manufacturing process, Properties and uses. Fibers- metal and synthetic, Properties and applications. Fiber reinforced plastics, Matrix materials, Fibers organic and synthetic, Properties and applications. Building materials from agro and industrial wastes ,Types of agro wastes, Types of industrial and mine wastes, Properties and applications. Masonry blocks using industrial wastes. Construction and demolition wastes.

UNIT – IV: Alternate Building Technologies: Use of arches in foundation, alternatives for wall constructions, composite masonry, confined masonry, cavity walls, rammed earth, Ferro cement and

ferroconcrete building components, Materials and specifications, Properties, Construction methods, Applications. Top down construction, Mivan Construction Technique. Alternate Roofing Systems: Concepts, Filler slabs, Composite beam panel roofs, Masonry vaults and domes.

UNIT – V: Equipment for Production of Alternate Materials: Machines for manufacture of concrete, Equipments for production of stabilized blocks, Moulds and methods of production of precast elements, Cost concepts in buildings, Cost saving techniques in planning, design and construction, Cost analysis: Case studies using alternatives.

Textbooks:

1. KS Jagadish, B V Venkatarama Reddy and K S Nanjunda Rao, "Alternative Building Materials andTechnologies", New Age International pub.
2. Arnold W Hendry, "Structural Masonry", Macmillan Publishers.

Reference Books:

1. RJS Spence and DJ Cook, "Building Materials in Developing Countries", Wiley pub.
2. LEED India, Green Building Rating System, IGBC pub.
3. IGBC Green Homes Rating System, CII pub.
4. Relevant IS Codes.

Course Outcomes:

Upon successful completion of the course, student will be able to:

1. Solve the problems of Environmental issues concerned to building materials and cost effective building technologies;
2. Select appropriate type of masonry unit and mortar for civil engineering constructions; also they are able to Design Structural Masonry Elements under Axial Compression.
3. Analyse different alternative building materials which will be suitable for specific climate and in an environmentally sustainable manner. Also capable of suggesting suitable agro and industrial wastes as a building material.
4. Recommend various types of alternative building materials and technologies and design a energy efficient building by considering local climatic condition and building material.

(C30161) LOGISTICS AND SUPPLY CHAIN MANAGEMENT
(Open Elective: Offered by MBA Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

The Objective of this course is to gain the knowledge of possibilities of efficient optimization and management of operation in integrated supply chains and also the ability to apply them in the enterprise reality. The course will also strengthen the holistic view on supply chain operations, management and strategy and some current research areas in supply chain management. Consequently the course provides advanced knowledge about logistics and their supporting systems from a supply chain perspective.
***The students need Statistical Table to solve numerical problems.** Prerequisite for the course:- Knowledge of Production and Operations Management, Marketing Management and QABLogistics and Supply Chain Management D taught in second semester of the Programme.

Unit – 1
Understanding the Supply Chain: Objective and Importance of Supply Chain Process View of Supply Chain. Competitive and Supply Chain Strategies, Achieving Strategic Fit, Expanding Strategic Scope. Logistics: The Logistical value preposition, The Work of Logistics, Logistical operations, Logistical operating arrangements, Supply chain Synchronization, Supply Chain Drivers and Metrics: Drivers for Supply Chain Performance, Framework for Structuring drivers. Facilities, inventory, transportation, information, sourcing and pricing. Obstacles to Achieving fit, Supply chain performance in India. Case studies

Unit – 2
Designing the Supply Chain Network : Role of distribution in the Supply Chain, Factors influencing Distribution network design, Design options for Distribution network, The role of network design in the Supply Chain, Frame work for Network design decisions, Models for facility location and capacity allocation, Planning Demand and Supply in a Supply Chain: Demand Forecasting in Supply Chain: Components of forecast and forecasting methods, Aggregate Planning in Supply Chain: Role of aggregate planning, Aggregate planning Strategies , Inventory planning and

economic theory aberrations. Case studies

Unit – 3

Planning and Managing inventories in Supply Chain: Managing Economies of Scale in Supply Chain, Managing Uncertainty in a Supply Chain, Determining optimal level of product inventory. Designing and Planning Transportation Networks: Transportation in a Supply Chain. Case studies

Unit – 4

Managing Cross Functional Drivers in a Supply Chain: Sourcing decisions in a Supply Chain and procurement strategies, Pricing and Revenue Management in a Supply Chain, Information Technology and Coordination in a Supply chain. Case studies

Unit- 5

Logistics and Supply chain relationships: Identifying logistics performance indicators –Channel structure – Economics of distribution – channel relationships –logistics service alliances. Managing Global logistics and Global supply chains: Logistics in a global economy – views of global logistics- global operating levels – interlinked global economy - The Global supply chains , Supply Chain Management in Global environment–Global strategy – Global purchasing – Global logistics–Global alliances –Issues and Challenges in Global supply chain Management – Case studies

Text Books:

1. Sunil Chopra and Peter Meindl: Supply chain Management: Strategy, Planning and Operation, Third edition, Pearson, 7th Edition, 2018
2. Donald J.Bowersox and David J.Closs: Logistical Management: The Integrated Supply Chain Process, TMH, 2006. 2nd Edition
3. Sridhara Bhat: Logistics and supply chain management, Himalaya, 1st Edition, 2016.
4. John T Mentzer: Supply Chain Management, Sage Publications, 2008 , 1st Edition
5. Donal Waters: Global Logistics, Kogan Page, 7th Edition, 2014

6. Christain schuh et al:The purchasing chess board, Springer link, 3rd Edition.
7. Philip B.Schary, TageSkjott-Larsen: Managing the Global Supply Chain, Viva, Edition 3, 2008.

Course Outcomes

1. Analyze growing importance of Supply Chain Management.
2. Identify Principles of SCM Costs and customer Profitability analysis.
3. Explain importance of Benchmarking in SCM
4. Outline CRM, Sourcing and factors considered for transportation
5. Evaluate Global aspects in SCM

(C30161) KNOWLEDGE MANAGEMENT
(Open Elective: Offered by MBA Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

Course Aim: The objective of the course is to provide the basics of the emerging area of Knowledge Management to students. This course through light on few important concepts as Knowledge management and Information Technology, Knowledge process, etc.

Unit 1

The Knowledge Economy: Leveraging Knowledge, Data-Information-knowledge-Wisdom relationship, organizational knowledge, characteristics and components of organizational knowledge –Building knowledge societies- Measures for meeting the challenges of implementing KM programmes.

Unit 2

Knowledge Management and Information Technology: Role Information Technology in Knowledge Management Systems, Knowledge Management tools,Creative effective Knowledge Management Systems through Information Technology, ERP and BPR, Data Warehousing and Data Mining.

Unit 3: Future of Knowledge Management and Industry perspective: Companies on the road to knowledge management, Knowledge Management in Manufacturing and service industry, challenges and future of Knowledge Management.

Unit 4

The Knowledge Process: Universal appeal, Stages of KM Process, Knowledge Capital vs physical capital, Customer Relationship Management, Business Ethics And KM, The Promise of Internet and the Imperatives of the new age.

Unit 5

Implementation of Knowledge Management: Discussion on Roadblocks to success,10-step KM Road Map of AmritTiwana, Business Intelligence

and Internet platforms, web Portals, Information Architecture: A three-way Balancing Act, KM, the Indian experience, Net Banking in India. –Role of knowledge Management in Organisational Restructuring. -The Mystique of a Learning Organisation.

Text Books:

1. Mattison: Web Warehousing & Knowledge Management, Tata McGraw-Hill,2009 , 2/e
2. Becerra Fernandez: Knowledge management: An Evolutionary view, PHI, 1st Edition,2009
3. Fernando:Knowledge Management, Routledge, 2nd Edition,2014
4. B.Rathan Reddy: Knowledge management, Himalaya,1st Edition, 2009
5. Tapan K Panda: Knowledge Management, Excel, 1st Edition, 2008.
6. Barnes: Knowledge Management systems, Cengage, 1st Edition, 2008.
7. Tiwana: The Knowledge Management tool kit, 2/e, Pearson Education, 2009.

OUTCOMES:

1. Understanding the key theories and models that inform knowledge management
2. Critically apply theory to organisations in order to identify and justify effective knowledge management strategies and activities
3. Access and evaluate information research findings relating to knowledge management
4. Communicate clearly and effectively incorporating variousknowledge management formats and technologies
5. Implementing the ethical implications in managing knowledge

(C30163) MANAGEMENT OF INDUSTRIAL RELATIONS
(Open Elective: Offered by MBA Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

(Students must read text book. Faculty are free to choose any other cases)

Course Aim: The aim of the course is to enable HR elective students develop awareness towards labour laws. The students will understand how to deal with legal problems emanating from employer and employee relations in organizations.

Learning Outcome: The student understands the industrial relations, its importance in HR and various Labour Laws like Factories Act, Wage and Bonus Act and Dispute Preventive and Corrective Mechanisms. They will also understand the role of Trade Unions, Settlement of disputes, Collective Bargaining, Wage Policy.

Unit I:

Industrial Relations: Introduction, concepts, importance of Industrial relations, scope and aspects of industrial relations, the management, the government factors affecting industrial relations, evolution of industrial relations policy, the industrial policy resolution 1991.

Unit II:

Anatomy of Industrial disputes and resolutions-I: industrial disputes , classification, causes, tripotisim, bipotism Tripartite and Bipartite Bodies, Standing orders and Grievance Procedure.

Unit III:

Anatomy of Industrial disputes and resolutions-II: Collective Bargaining, Conciliation, Arbitration, Adjudication, The Industrial Dispute Act 1947, Labour Welfare work, Labour Welfare officer, Worker's Participation.

Unit IV:

Industrial relations legislation-I: Wage Policy and Wage Regulation Machinery, Wage Legislation, Payment of Wages Act 1936, The Payment of Bonus Act,1965, Minimum wages Act-1948.

Unit V:

Industrial relations legislation-II: The Factories Act 1948, Mines Act 1952, Industrial Relations and Technological Change.

Text Books:

1. Arun Monappa (2012). Industrial Relations. New Delhi: Tata McGraw- Hill Publishing Company Ltd, 2nd Edition.
2. Mamoria C.B, Mamoria, G. (2010). Dynamics of Industrial Relations. New Delhi: Himalayan Publications, 16th Edition, 2019
3. Padhi, P.K. (2012). Labour & Industrial Laws. New Delhi: PHI Learning P. Ltd, 2nd Edition.
4. Kapoor, N.D. (2014). Elements of Mercantile Law. New Delhi: S.Chand& Co., 38th Edition
5. Subramani, P N. &Rajendran, G. (2001). Human Resources Management and Industrial Relations. New Delhi: Himalaya Publishing House, 1st Edition.
6. Pylee, P V. & A Simon George. (1995). Industrial relations and personnel Management. New Delhi: Vikas Publishing House Pvt. Ltd., New Delhi, 2nd Edition.
7. Verma, P. (1991). Management of Industrial Relations Reading and cases. Oxford and IBH publications, 4th Edition.

Course Outcomes

1. Access the concept and Scope of Industrial Relations and its resolution.
2. Outline the knowledge towards Trade unions, Industrial disputes and Grievance Procedure.
3. Identify various Laws on Wages, Welfare and Social Security.
4. Illustrate rules and regulations of working conditions.
5. Enlighten on quality standards in industry.

(C30164) Entrepreneurship
(Open Elective: Offered by MBA Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

Aim: The aim of this subject is to inspire students to become entrepreneurs so that they will emerge as job providers rather than job seekers.
Learning Outcome: By the end of this course the students should be able to understand the mindset of the entrepreneurs, identify ventures for launching, develop an idea on the legal framework and also understand strategic perspectives in entrepreneurship.

Unit I:
Understanding Entrepreneurial Mindset- The revolution impact of entrepreneurship- The evolution of entrepreneurship- Approaches to entrepreneurship- Process approach- Twenty first centaury trends in entrepreneurship.

Unit II:
The individual entrepreneurial mind-set and Personality- The entrepreneurial journey- Stress and the entrepreneur- the entrepreneurial ego- Entrepreneurial motivations. Corporate Entrepreneurial Mindset- the nature of corporate entrepreneur- conceptualization of corporate entrepreneurship Strategy-sustaining corporate entrepreneurship.

Unit III:
Launching Entrepreneurial Ventures- opportunities identification-entrepreneurial Imagination and Creativity- the nature of the creativity process-Innovation and entrepreneurship. Methods to initiate Ventures-Creating new ventures-Acquiring an Established entrepreneurial venture-Franchising-hybrid- disadvantage of Franchising.

Unit IV:
Legal challenges of Entrepreneurship-Intellectual property protection-Patents, Copyrights-Trade marks and Trade secrets-Avoiding trademark pitfalls. Formulation of the entrepreneurial Plan- The challenges of new venture start-ups, Poor financial Understanding-Critical factors for new

venture development-The Evaluation process-Feasibility criteria approach.

Unit V:

Strategic perspectives in entrepreneurship- Strategic planning-Strategic actions- strategic positioning-Business stabilization- Building the adaptive firms-Understanding the growth stage-Unique managerial concern of growing ventures.

Text Books:

1. D F Kuratko and T V Rao "Entrepreneurship- A South-Asian Perspective "Cengage Learning, 1st edition, 2012. **(For PPT, Case Solutions Faculty may visit : login.cengage.com)**
2. Vasant Desai "Small Scale industries and entrepreneurship" Himalaya publishing, 9th Edition, 2017.
3. Rajeev Roy "Entrepreneurship" 2e, Oxford, 2012.
4. B.Janakiram and M.Rizwana" Entrepreneurship Development :Text & Cases, Excel Books, 1st Edition, 2011.
5. Stuart Read, Effectual Entrepreneurship, Routledge, 2nd Edition, 2013.
6. Robert Hisrich et al "Entrepreneurship" 6th e, TMH, 2012.

Course Outcomes

1. Identify the Qualities, requirements, Risk & Ethical issues to become an Entrepreneur.
2. Analyze and develop the conceptualization of corporate Entrepreneurship.
3. Explore different possibilities to start an Enterprise for young Entrepreneurs.
4. Outline challenging benchmarks for formulation of Entrepreneurship.
5. Evaluate the application of Strategic action for growing ventures.

(C30165) BASICS OF INSURANCE & TAXATION
(Open Elective: Offered by MBA Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

(Students must read text book. Faculty are free to choose any other cases)

Course Aim: To provide the basic concepts of Income Tax.

Learning Outcome: The Objective of the course is to provide the candidates with sound knowledge of the important provisions of the Income Tax law and their applications.

Unit I: Introduction to Life Insurance and General Insurance : Introduction to Life Insurance - Principles of Life Insurance - Life insurance products, pensions and annuities , Introduction to General Insurance. Principles of General Insurance. Types of General Insurance - Personal general insurance products (Fire, Personal Liability, Motors, Miscellaneous Insurance). Terminology, clauses and covers.

Unit II:Claim Management & Re-Insurance : Claim Management - Claim Settlement - Legal Framework - Third party Administration, Insurance ombudsman - Consumer Protection Act - Re-Insurance in Life Insurance - Retention Limits - Methods of Re-insurance.

Unit III: General Perspectives and Income Tax rate Structure: Historical background of Taxation Laws in India, Fundamental Principles of Income Tax and concepts, Government Financial Policies regarding Taxation. Tax structure and its Role in Indian Economy, Residential Status, Non Resident persons & Non Ordinary Resident, Previous year and Assessment year Tax: Fees and cess, Capital Expenditure and Capital Income. Revenue Expenditure and Revenue Income, Tax Evasion and Tax Avoidance,Direct and Indirect Taxes.

Unit IV:

Heads and Sources of Income and Exemptions & Deductions under the Income Tax: Salary and Fringe Benefit Tax, Income from House Property, Income from Business; Profession or Vocation, Capital Gains, Income from

other sources. (Theory only), Exemptions & Deductions under the Income Tax Act,Income exempt u/s 10 of the I.T. Act, Permissible deductions under Chapter VI of I.T. Act, Relief, Double Taxation Relief.

Unit V:

Assessment Procedures:PAN AND TAN, Filing of return and e-filling, Advance payment of Tax, Tax deduction at source, Tax Collection at Source, Refund of Tax, and Types of Assessment. Computation of Income in Individuals

Text Books:

1. Mishra M.N: Insurance Principles and Practice; S.Chand and Co. New Delhi, 22nd Edition.
2. Principles of Life Insurance: Dr.Shrikrishan Laxman Karve, Himalaya, First Edition, 2017
3. Insurance: Theory & Practice: Tripathy& Pal, PHI, 2nd Edition, 2006
4. Taxation: H.Prem raja - Sri Hamsrala publications, 1/e
5. Direct Taxes Law & Practice with Supplement: Dr. V K Singhania, Taxman Publications, 64th Edition.
6. Gour and Narang - Income Tax Law and Practice, Kalyani Publication, 47th Edition, 2019.
7. Practicals in Taxation: H.Prem raja - Sri Hamsrala publications,1/e.
8. Income Tax: B.B. Lal, Pearson Education, 1st Edition, 2012

COURSE OUTCOMES:

1. Explain the basic legal concepts and general principles of Insurance sector.
2. Implement claim management and settlement.
3. Explain the importance of income tax and its structure
4. Analyze tax exemptions and deductions of income tax.
5. Prepare tax assessments, computation of individual Incomes

(C30166) BUSINESS ETHICS & CORPORATE GOVERNANCE
(Open Elective: Offered by MBA Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

(Students must read text book & References. Faculty are free to choose any other cases)

Course Aim: The aim of this subject is to inculcate the need for business ethics to ensure sustained business stability.

Learning outcome: The learning outcome developing business ethics and professional ethics. They will also be able to understand ethical and psychological dimensions to contain cybercrimes and also will be able grasp the important issues related to corporate governance.

Unit I

Business Ethics The Changing Environment: Business Ethics-why does it matter?; Levels of Business Ethics-Five Myths about Business Ethics-Can Business Ethics be Taught and Trained?; stages of Moral development, Kohlberg's study- Carol Gilligan's Theory-Principles of Ethics.

Unit II

Professional Ethics. Introduction to Professional Ethics- Ethics in Production and Product Management-Ethics of Marketing Professionals-Ethics in HRM-Ethics of Finance and Accounting Professionals-Ethics of Advertisement-Ethics of Media Reporting-Ethics of Healthcare Services. Ethical Dilemma. Introduction, Dilemma and Ethical Dilemma-Mounting Scandals-Ethical Issues-Preparatory Ethics: Proactive steps-The software challenge.

Unit III

Cyber crimes and cyber Terrorism-social,Political, ethical and psycological , dimensitional , Intellectual properrty in the cyberspace,Ethical dimenstions of cyber crimes-the psycology, mindset & Skills of Hackers & Other cyber criminals, Sociology of cyber criminals, inforamtion Warfare.

Unit IV

Corporate Governance I: Does Good Governance Really matters to Corporations?-Importance of corporate Governance –Corporate Governance in India-Board Structures Processes and Evaluation-Director Independence –Board committees, Indian model of Corporate Governance.

Unit V

Corporate Governance-II: Information communication and Disclosure-Irani Committee Report-OECD Principles of Corporate Governance –Risk, Internal Control and Assurance-Banks and Corporate Governance.

Text Books:

1. SK Mandal: Ethics in Business and Corporate Governance, TMH, 2/e, 2012. Journal of Human Values : IIM Calcutta. SAGE.
2. Archie. B Carroll, Business Ethics-Brief Readings on Vital Topics, Routledge, 1st Edition, 2013.
3. A.C.Fernando: Corporate Governance, Principles, Policies and Practices, Pearson, 3rd Edition,2012.
4. C.S.V.Murthy: Business Ethics, Himalaya Publishing House, 2nd Edition, 2012.
5. N.Balasubramanian : Corporate Governance and Stewardship, TMH,4th Edition.
6. Nina Godbole & Sunit Belapure " Cyber Security" wiley india, 1st Edition, 2012.
7. Joseph W.Weiss : Business Ethics, Thomson, 4th Edition,2006.
8. Geethika,RK Mishra, Corporate Governance Theory and Practice,Excel, 1st Edition, 2011.
9. Dr.S.S.Khanka, Business Ethics and Corporate Governance, S.Chand, 1/e, 2013.
10. K.PraveenParboteeach, Business Ethics, Routledge, 2nd Edition, 2018.
11. Praveen B Malla, Corporate Governance, Routledge, 1st Edition, 2010.

Course Outcomes

1. Identify the concept and principles of Business ethics
2. Analyze the importance of Professional Ethics and relate Ethical Dilemma to Business Practices
3. Outline the factors of Cyber crime and Cyber Terrorism.
4. Predict stakeholder's roles in corporate Governance.
5. Review committee Reports on development of Corporate Governance.

(C30167) MARKETING MANAGEMENT
(Open Elective: Offered by MBA Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

The Objective of the course is to have the basic concepts of marketing which is one of the important areas of functional management.

Unit I

Understanding Marketing Management: Concepts of Marketing, Marketing Strategies & Plans, Creating long term Loyalty relationships, Marketing mix, Product Life Cycle.

Unit II

Connecting with Customers & Building Strong Brands: Analyzing Competitors, Conducting Marketing Research, Consumer Behaviour, Identifying market segments and targets, crafting Brand Positioning.

Unit III

New Product and Promotions: Introducing New Market Offering, Developing Pricing Strategies & Programmes, Designing & Managing Integrated Marketing Communications, Advertising & Sales Promotions, Managing Digital Communication – Online, Social Media & Mobile, Personal Selling.

Unit IV

Delivering Value: Managing Retailing, Wholesaling and logistics, Designing and Managing Integrated Marketing Channels.

Unit V

Sales Management: Nature and Importance of Sales Management, Skills of Sales Manager, Sales objectives, Concepts of Sales organization, Type of

Sales organization.

Text books:

1. Philip Kotler, Gray Armstrong, Principles of Marketing, 15e, Pearson Education, 2016.
2. Lamb, Hair, Sharma, Mc Daniel, Principles of Marketing, A South Asian Perspective Cengage Learning, 11/e, 2016.
3. RajanSaxena, Marketing Management, 3e, Tata Mc Graw Hill, 2012.
4. Kenneth E Clow, Donald Baack, Cases in Marketing Management, Sage South Asia edition, 2012.
5. Adrian Palmer: Introduction to Marketing, Theory and Practice, 2nd Edition, Oxford, 2011.
6. S. Neelamegham, Marketing in India text & cases, 4th edition, Vikas, 2013.
7. Marketing Management 22e, Arun Kumar, Menakshi, Vikas Publishing

COURSE OUTCOMES:

On completion of the course students will be able to:

1. Analyze the scope, concepts of Marketing and forecasting techniques in present Global Market Environment.
2. Outline Segmentation, targeting and Positioning Goods and Services in Market.
3. Develop conceptual knowledge on consumer behavior, Marketing Mix and Promotional mix elements
4. Illustrate marketing channels of distribution
5. Analysing sales management and skills of sales manager.

(C30168) Intellectual property rights
(Open Elective: Offered by MBA Department)

B. Tech. (CE)

L	T	P	C
3	0	0	3

The Objective of the course is to have the basic concepts of Intellectual Property Rights through which a firm/individual can protect its existence through its uniqueness.

UNIT-I: INTRODUCTION TO INTELLECTUAL PROPERTY: Introduction, types of intellectual property, international Organizations, agencies and treaties, importance of intellectual property rights.

UNIT-II: TRADE MARKS: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, Selecting and evaluating trade mark, trade mark registration processes.

UNIT-III: LAW OF COPY RIGHTS: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right owner ship issues, copy right registration, notice of copy right , international copy right law.

Law of Patents: Foundation of patent law, patent searching process, owner rights and transfer.

UNIT-IV: TRADE SECRETS: Trade secret law, determination of trade secrete status' liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

UNFAIR COMPETITION: Misappropriation right of publicity, false advertising

UNIT-V: NEW DEVELOPMENT OF INTELLECTUAL PROPERTY: new developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international-trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT BOOKS & REFERENCES

- Intellectual property right, Deborah, E. Bouchoux, cengage learning, 5th Edition.
- Intellectual property right - Unleashing the knowledge economy, PrabuddhaGanguli, Tata Mc Graw Hill Publishing Company Ltd., 1st Edition.

COURSE OUTCOMES:

On completion of the course students will be able to:

1. Skill to understand the concept of intellectual property rights.
2. Develops procedural knowledge to Legal System and solving the problem relating Patents.
3. Gain knowledge on development and owning of Trade Marks, Copy Rights, and Patents.
4. Develops conceptual exposure on legal aspects related to IPR
5. Knowledge on different types of competition and ethical and unethical practices of advertising.