**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**
**(Autonomous)**
Kandlakoya, Hyderabad – 501 401
**ACADEMIC REGULATIONS R 18**
**FOR CBCS & OUTCOME BASED B.TECH. REGULAR PROGRAMMES**
(Effective for the students admitted into I year from the Academic Year 2018-19 onwards)

**1.0 Under-Graduate Degree Programme in Engineering & Technology**

CMR College of Engineering & Technology, Hyderabad offers 4 Years (8 Semesters) Bachelorof Technology (B.Tech.) degree Programme, under Choice Based Credit System (CBCS), with effect from the Academic Year 2018 - 19 andonwards, 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 |
| VI. | Information Technology |

**2.0 Admission Procedure**

2.1. Admissionswill bedone asper the normsprescribedbythe Government of Telangana. The Governmentorders invogueshallprevail.

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% of intake) 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: Practicals 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, SocialSciences 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 for the each of the UG PROGRAMME E&T (B.Tech. Degree Programmes), is as listed below:

| *S. No.* | *Broad CourseClassi ficati-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 including Management Courses** | Includes subjects related to Humanities, Social Sciences and Management | **12*** |

| | | | | |
|---|---|---|---|---|
| 4 | **Core Courses (Co C)** | **PCC– Professional CoreCourses** | 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 amaximum 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 typicalSWL 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 $\geq$ 5.0 ( in each Semester), and CGPA (at the end of each successive Semester) $\geq$ 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 Practicals 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 four Open Electives during the programme by meeting pre-requisite of the course if any. However, students cannot opt for open elective course if it is already studied by the student as part of Professional Elective or any other category. 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.

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**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 total100 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

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

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

$$\textbf{CGPA} = \{\sum_{j=1}^{M} C_j\, G_j\} / \{\sum_{j=1}^{M} C_j\} \ldots \textbf{for all S Semesters registered}$$

**(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.

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

(ApplicableforthestudentsadmittedintoIIyearB.Tech.(Lateral EntryScheme) fromtheAcademicYear2019-20 and onwards)

1. **Eligibility foraward ofB. Tech.Degree(LES)**

1.1. The LES candidates shall pursue a course of study for not less than three academic years and not more thansixacademicyears.

1.2. The candidate shall register for 122 credits and secure 122 credits from II to IV-year B.Tech. Program (LES) for the award of B.Tech. Degree. They are exempted from the courses of I year offered to regular entry students.

1.3. The students, who fail to fulfill the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seats.

1.4. The attendanceregulationsof B.Tech.(Regular)shallbeapplicabletoB.Tech. (LES).

2. **Promotion Rule**

A student shall be eligible for promotion in B.Tech programme,if he/she acquires the minimumnumber of creditsasgivenbelow:

2.1. A student shall be promoted from II Year to III Year only if he/she fulfills the academic requirements of 24 credits out of 41credits (60% of average credits) up to II-year II Semester, from all the examinations, whether or not the candidate takes the examinations.

2.2. A student shall be promoted from III year to IV year only if he/she fulfills the academic requirements of 49 credits out of 83credits (60% of average credits) up to III Year II Semester from all the examinations, whetheror not the candidate takes the examinations.

2.3. A student shall register and put up minimum attendance in all 122 credits and earn all 122 credits to be eligible for the award of degree.

2.4. Students who fail to earn 122 credits as indicated in the course structure within six academic years from the year of their admission shall forfeit their seatin B.Tech.Course and their admission stands cancelled.

3. **Award of Class**

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

## MALPRACTICE RULES

Disciplinary Action for Malpractices/Improper Conduct in Examinations

| | **Nature of Malpractices/ Improper conduct** | **Punishment** |
|---|---|---|
| 1.(a) | Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination) | Expulsion from the examination hall and cancellation of the performance in that subject only. |
| (b) | Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter. | Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. |
| 2. | Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that |

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| | | Semester/year. The Hall Ticket of the candidate is to be cancelled. |
| 3. | Impersonates any other candidate in connection with the examination. | The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate Who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the Remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him. |
| 4. | Smuggles the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination | Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester Examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. |
| 5. | Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to | Cancellation of the performance in that subject |

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| | award pass marks | |
| 6. | Refuses to obey the orders of the Chief Superintendent/Assistant–Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the or organizes a walk out or instigates others **to** examination hallwalk out, or threatens the officer- in-charge or any person on duty in or outside the examination hall of any injury**,** to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer- in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination. | In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates are also debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. |
| 7. | Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall. | Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all |

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| | | University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. |
| 8. | Possess any lethal weapon or firearm in the examination hall. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of That semester/year. The candidate is also debarred and forfeits the seat. |
| 9. | If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8. | If the student belongs to the college, expulsion from the examination performance in that subject and all other subjects shall and cancellation of the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. |
| 10. | Comes in a drunken condition to the examination hall. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for other remaining examinations of the subjects of that semester/year. |
| 11. | Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny. | Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year. |
| 12. | If any malpractice is detected which is not covered in the | |

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| | above clauses 1 to 11 shall be reported to the College Academic Committee for further action to award suitable punishment. | |

**Malpractices identified by squad or special invigilators**

Punishments to the candidates as per the above guidelines.

**Malpractice identified at Spot center during valuation**

1) The following procedure is to be followed in the case of malpractice cases detected during valuation, scrutiny etc. at spot center. Malpractice is detected at the spot valuation. The case is to be referred to the malpractice committee. Malpractice committee will meet and discuss/question the candidate and based on the evidences, the committee will recommend suitable action on the candidate.
2) A notice is to be served to the candidate(s) involved through the Principal to his address and to the candidate(s) permanent address regarding the malpractice and seek explanations.
3) The involvement of staff who are in charge of conducting examinations, invigilators valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing in correct or misleading information) that infringe upon the course of natural justice to one and all concerned at the examinations shall be viewed seriously and recommended for award of appropriate punishment after thorough enquire.
4) Based on the explanation and recommendation of the committee action may be initiated.

5) **Malpractice committee:**

| | | |
|---|---|---|
| **(a)** | Controller of Examinations | Chairman |
| **(b)** | Assistant Controller of Evaluation | Member |
| **(c)** | Chief Examiner of the Course/ Subject Expert | Member |
| **(d)** | Concerned Head of the Department | Member |
| **(e)** | Concerned Invigilator | Member |

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous)
**DEPARTMENT OF CSE**

## Institute Vision

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

**Institute Mission**

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

**Vision of the Department**

- To evolve as a centre of academic excellence in Computer Science & Engineering by building strong teaching and research environment.

**Mission of the Department**

- To offer high quality graduate and post graduate programs in computer science education and to prepare students for professional career and/or higher studies globally.
- To develop self learning abilities and professional ethics to serve the society.

## Program Educational Objectives (PEOs)

**PEO I**: Excel in their professional career and higher education in Computer Science & Engineering and chosen fields.
**PEO II**: Demonstrate leadership qualities, team work and professional ethics to serve the society
**PEO III**: Adapt to state of art technology through continuous learning in the areas of interest.

## Program Outcomes

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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# B. Tech (CSE) Course Structure-R-18

| Semester –I | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | **Category** | **Course Title** | **Hours Per Week** | | | **Credits** | **Total Contact Hours/ Week** |
| | | | L | T | P | C | |
| A30001 | HSMC | English | 2 | 0 | 0 | 2 | 2 |
| A30004 | BSC | Linear Algebra and Calculus | 3 | 1 | 0 | 4 | 4 |
| A30011 | BSC | Engineering Chemistry | 3 | 0 | 0 | 3 | 3 |
| A30501 | ESC | Programming for Problem Solving | 3 | 0 | 0 | 3 | 3 |
| A30002 | HSMC | English Language Communication Skills Lab | 0 | 0 | 3 | 1.5 | 3 |
| A30012 | BSC | Engineering Chemistry Lab | 0 | 0 | 3 | 1.5 | 3 |
| A30502 | ESC | C Programming Lab | 0 | 0 | 3 | 1.5 | 3 |
| A30314 | ESC | Engineering Workshop | 0 | 0 | 3 | 1.5 | 3 |
| A30020 | HSMC | Introduction to Social Innovation | 0 | 0 | 2 | 1 | 2 |
| **Total** | | | **11** | **1** | **14** | **19** | **26** |

| Semester –II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | **Category** | **Course Title** | **Hours Per Week** | | | **Credits** | **Total Contact Hours/ Week** |
| | | | L | T | P | **C** | |
| A30005 | BSC | Ordinary Differential Equations and Multivariable Calculus | 3 | 1 | 0 | 4 | 4 |
| A30009 | BSC | Applied Physics | 3 | 1 | 0 | 4 | 4 |
| A30503 | ESC | Data Structures & Algorithms | 3 | 0 | 0 | 3 | 3 |
| A30313 | ESC | Engineering Drawing | 1 | 0 | 3 | 2.5 | 4 |
| A30023 | BSC | Applied Physics Lab | 0 | 0 | 3 | 1.5 | 3 |
| A30504 | ESC | Data Structures & Algorithms Lab | 0 | 0 | 3 | 1.5 | 3 |
| A30505 | ESC | Basic Internet of Things Lab | 0 | 0 | 2 | 1 | 2 |
| A30019 | BSC | Engineering Exploration &Practice | 0 | 0 | 3 | 1.5 | 3 |
| **Total** | | | **10** | **2** | **14** | **19** | **26** |
| **Total Credits I year: 38** | | | | | | | |

| Semester –III |
|---|

| Course Code | Category | Course Title | Hours Per Week | | | Credits | Total Contact Hours/ Week |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | C | |
| A30506 | PCC | Discrete Mathematics | 3 | 0 | 0 | 3 | 3 |
| A30461 | ESC | Analog & Digital Electronics | 3 | 0 | 0 | 3 | 3 |
| A30513 | PCC | Computer Organization & Architecture | 3 | 1 | 0 | 4 | 4 |
| A30507 | PCC | Object Oriented Programming | 3 | 1 | 0 | 4 | 4 |
| A30509 | PCC | Database Management Systems | 3 | 1 | 0 | 4 | 4 |
| A30508 | PCC | Object Oriented Programming through JAVA Lab | 0 | 0 | 4 | 2 | 4 |
| A30510 | PCC | Database Management Systems Lab | 0 | 0 | 3 | 1.5 | 3 |
| A30021 | HSMC | Social Innovation in Practice | 0 | 0 | 2 | 1 | 2 |
| A30015 | MC | Soft Skills & Professional Ethics | 0 | 0 | 2 | 0 | 2 |
| **Total** | | | **15** | **3** | **11** | **22.5** | **29** |

**Semester –IV**

| Course Code | Category | CourseTitle | Hours Per Week | | | Credits | Total Contact Hour/ Week |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | C | |
| A30007 | BSC | Numerical Techniques &ProbabilityDistributions | 3 | 1 | 0 | 4 | 4 |
| A30511 | PCC | Design & Analysis of Algorithms | 3 | 1 | 0 | 4 | 4 |
| A30525 | PCC | Software Engineering | 3 | 0 | 0 | 3 | 3 |
| A30228 | ESC | Basic Electrical Engineering | 3 | 0 | 0 | 3 | 3 |
| A30229 | ESC | Basic Electrical Engineering Lab | 0 | 0 | 3 | 1.5 | 3 |
| A30462 | ESC | Analog & Digital Electronics lab | 0 | 0 | 3 | 1.5 | 3 |
| A30512 | PCC | Algorithms Lab | 0 | 0 | 3 | 1.5 | 3 |
| A30016 | MC | Gender Sensitization | 0 | 0 | 2 | 0 | 2 |
| A30022 | MC | NCC/NSS | 0 | 0 | 2 | 0 | 2 |
| **Total** | | | **12** | **2** | **13** | **18.5** | **27** |

**Total Credits II year: 41**

**Semester –V**

| Course Code | Category | Course Title | Hours /week | | | Credits | Total Contact Hours/ Week |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | C | |
| A30514 | PCC | Computer Networks | 3 | 0 | 0 | 3 | 3 |
| A30516 | PCC | Operating Systems | 3 | 0 | 0 | 3 | 3 |
| A30518 | PCC | Formal Languages & Automata Theory | 3 | 1 | 0 | 4 | 4 |
| PE | PEC | Professional Elective-I | 3 | 0 | 0 | 3 | 3 |
| A30530 | PCC | Artificial Intelligence | 3 | 0 | 0 | 3 | 3 |
| A30515 | PCC | Computer Networks Lab | 0 | 0 | 3 | 1.5 | 3 |
| A30517 | PCC | Operating Systems Lab | 0 | 0 | 3 | 1.5 | 3 |
| A30526 | PCC | Mobile App Development Lab | 0 | 1 | 2 | 2 | 3 |
| A30014 | MC | Environmental Sciences | 2 | 0 | 0 | 0 | 2 |
| **Total** | | | **17** | **2** | **8** | **21** | **27** |
| A30548 | MC | Mini Project-I | During Summer Vacations / Non-Credit | | | | |
| A30550 | | Summer Internship-I | | | | | |

| Semester –VI | | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Code | Category | Course Title | Hours/Week | | | Credits | Total Contact Hours/Week |
| | | | L | T | P | C | |
| A30519 | PCC | Compiler Design | 3 | 1 | 0 | 4 | 4 |
| A30521 | PCC | Scripting Languages | 3 | 0 | 0 | 3 | 3 |
| A30523 | PCC | Web Technologies | 2 | 0 | 0 | 2 | 2 |
| PE | PEC | Professional Elective-II | 3 | 0 | 0 | 3 | 3 |
| A30522 | PCC | Scripting Languages Lab | 0 | 0 | 3 | 1.5 | 3 |
| A30520 | PCC | Compiler Design Lab | 0 | 0 | 3 | 1.5 | 3 |
| A30524 | PCC | Web Technologies Lab | 0 | 0 | 3 | 1.5 | 3 |
| A30003 | HSMC | Advanced English Communication Skills Lab | 0 | 0 | 3 | 1.5 | 3 |
| A30546 | PROJ | Technical Seminar-I | 2 | 0 | 0 | 2 | 2 |
| A30017 | MC | Indian Constitution | 2 | 0 | 0 | 0 | 2 |
| A30018 | MC | Essence of Indian Traditional Knowledge | | | | | |
| A30556 | MC | Cyber Security | 2 | 0 | 0 | 0 | 2 |
| **Total** | | | **17** | **1** | **12** | **20** | **30** |
| **Total Credits III Year: 41** | | | | | | | |

| **Semester –VII** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | **Category** | **Course Title** | **Hours Per Week** | | | **Credits** | **Total Contact Hours/week** |
| | | | L | T | P | C | |
| A30013 | HSMC | Business Management & Financial Analysis | 4 | 0 | 0 | 4 | 4 |
| PE | PEC | Professional Elective-III | 3 | 0 | 0 | 3 | 3 |
| | PEC | Professional Elective-IV | 3 | 0 | 0 | 3 | 3 |
| | PEC | Professional Elective-V | 3 | 0 | 0 | 3 | 3 |
| OE | OEC | Open Elective-I | 3 | 0 | 0 | 3 | 3 |
| | OEC | Open Elective-II | 3 | 0 | 0 | 3 | 3 |
| A30552 | PROJ | Major Project Phase-I | 0 | 0 | 6 | 3 | 6 |
| **Total** | | | **19** | **0** | **6** | **22** | **25** |
| A30549 | MC | Mini Project-II | During Summer Vacations / Non-Credit | | | | |
| A30551 | | Summer Internship-II | | | | | |

| **Semester –VIII** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | **Category** | **Course Title** | **Hours / Week** | | | **Credits** | **Total Contact Hours /week** |
| | | | L | T | P | C | |
| PE | PEC | Professional Elective-VI | 3 | 0 | 0 | 3 | 3 |
| OE | OEC | Open Elective-III | 3 | 0 | 0 | 3 | 3 |
| | OEC | Open Elective-IV | 3 | 0 | 0 | 3 | 3 |
| A30547 | PROJ | Technical Seminar-II | 2 | 0 | 0 | 2 | 2 |
| A30553 | PROJ | Major Project Phase- II | 0 | 0 | 14 | 7 | 14 |
| **Total** | | | **11** | **0** | **14** | **18** | **25** |
| **Total Credits IV Year: 40** | | | | | | | |

***

| Professional Electives | | | |
|---|---|---|---|
| **Sl. No** | **SubjectCode** | **Name of the Subject** | **Category** |
| 28 | A30528 | Data Warehousing and Data Mining | PEC-I |
| 29 | A30529 | Software Testing Methodologies | |
| 30 | A30527 | Information Security | |
| | | | |
| 31 | A30558 | Data Visualization | PEC-II |
| 32 | A30532 | Software Project Management | |
| 33 | A30533 | Mobile Computing | |
| | | | |
| 34 | A30534 | Design Patterns | PEC-III |
| 35 | A30535 | Machine Learning | |
| 36 | A30536 | Adhoc& Sensor Networks | |
| | | | |
| 37 | A30537 | Data Analytics with R | PEC-IV |
| 38 | A30538 | Deep Learning | |
| 39 | A30539 | Ethical Hacking | |
| | | | |
| 40 | A30540 | Big Data Analytics | PEC-V |
| 41 | A30541 | Computer Vision & Image Processing | |
| 42 | A30542 | Cloud Computing | |
| | | | |
| 43 | A30543 | Natural Language Processing | PEC-VI |
| 44 | A30544 | Internet of Things | |
| 45 | A30545 | Block Chain Technologies | |

| Open Electives | | |
|---|---|---|
| **Sl.No** | **Subject Code** | **Name of the Subject** |
| 1 | A30554 | Java Programming |
| 2 | A30531 | Python Programming |
| 3 | A30555 | Introduction to Database Management Systems |
| 4 | A30537 | Data Analytics with R |
| 5 | A30557 | Web Programming |
| 6 | A30542 | Cloud Computing |
| 7 | A30538 | Deep Learning |
| 8 | A30559 | Introduction to Data Science |
| 9 | A30471 | Principles of Electronic Communications |
| 10 | A30472 | Basic Electronics Engineering |
| 11 | A30383 | Fundamentals of Engineering Materials |
| 12 | A30377 | Basics of Thermodynamics |
| 13 | A30258 | Basics of Power Electronics & Drives |
| 14 | A30252 | Power Generation Systems |
| 15 | A30160 | Disaster Management and Mitigation |
| 16 | A30161 | Remote Sensing and GIS |
| 17 | C30161 | Logistics and Supply Chain Management |
| 18 | C30162 | Knowledge Management |
| 19 | A30473 | Image Processing |
| 20 | A30474 | Digital Electronics |
| 21 | A30357 | Fundamentals of Manufacturing Processes |
| 22 | A30379 | Fundamentals of Automobile Engineering |
| 23 | A30259 | Electrical & Hybrid Vehicles |
| 24 | A30260 | Electrical Safety |
| 25 | A30162 | Green Buildings |
| 26 | A30163 | Air Pollution and Control |

| | | |
|---|---|---|
| 27 | C30163 | Management of Industrial Relations |
| 28 | C30164 | Entrepreneurship |
| 29 | A30475 | Data Communications |
| 30 | A30476 | Microcontrollers & Applications |
| 31 | A30382 | Fundamentals of Mechanical Engineering |
| 32 | A30378 | Waste to Energy |
| 33 | A30253 | Fuel Cell Technology |
| 34 | A30255 | Energy Efficiency in Electrical Utilities |
| 35 | A30164 | Basic Civil Engineering |
| 36 | A30165 | Sustainability Concepts in Civil Engineering |
| 37 | C30165 | Basics of Insurance & Taxation |
| 38 | C30166 | Business Ethics & Corporate Governance |
| 39 | A30477 | Fundamentals of Embedded Systems |
| 40 | A30478 | Sensors & Transducers |
| 41 | A30358 | Industrial Safety Engineering |
| 42 | A30360 | Work System Design |
| 43 | A30256 | Energy Audit & Conservation |
| 44 | A30257 | Nano Technology |
| 45 | A30166 | Environmental Protection and Management |
| 46 | A30167 | Alternate Building Materials |
| 47 | C30167 | Marketing Management |
| 48 | C30168 | Intellectual Property Rights |

**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.**

| **Non-CSE/IT-Mandatory Course** | | |
|---|---|---|
| **S. No** | **Subject Code** | **Subjevt Name** |
| **1** | **A30560** | **INTRODUCTION TO ARTIFICIAL INTELLIGENCE** |

## (A30001) ENGLISH

**B. Tech (CSE) I Semester**

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 2 |

**UNIT-I:**
**Reading:** On the Conduct of Life: William Hazlittfrom "Language and Life: A Skills Approach" Published by Orient Black Swan, Hyderabad.
**Grammar:** Prepositions
**Vocabulary:** Word Formation I: Introduction to Word Formation
**Writing:** Clauses and Sentences

**UNIT-II:**
**Reading:** The Brook: Alfred Tennyson from "Language and Life: A Skills Approach"Published by Orient Black Swan, Hyderabad**.**
**Grammar:** Articles
**Vocabulary:** Word Formation II: Root Words from Other Languages
**Writing:** Punctuation
**Life Skills:** Self Improvement- 'How I Became a Public Speaker': George Bernard Shah

**UNIT-III:**
**Grammar:** Noun-Pronoun Agreement, Subject-Verb Agreement
**Vocabulary:** Word Formation III: Prefixes and Suffixes from Other Languages
**Writing:** Principles of Good Writing
**Life Skills:** Time Management- 'On Saving Time': *Seneca*

**UNIT-IV:**
**Grammar:** Misplaced Modifiers
**Vocabulary:** Synonyms and Antonyms
**Writing:** Essay Writing
**Life Skills:** Innovation- Muhammad Yunus – A biography

**UNIT –V:**
Reading: Politics and English Language: George Orwell from "Language and Life: A Skills Approach" Published by Orient Black Swan, Hyderabad.
Grammar: Clichés, Redundancies
Vocabulary: Common Abbreviations
Writing: Writing a Summary

**TEXTBOOKS:**

1. A Text book entitled **"Language and Life: A Skills Approach"** Published by Orient Black Swan, Hyderabad. ISBN:978-93-5287-422-4

**REFERENCES:**

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 PushpLata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

**COURSE OUTCOME:**

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

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

**END**

## (A30004) LINEAR ALGEBRA AND CALCULUS
## (Common to all branches)

**B. Tech (CSE) I Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**UNIT-I**

**Matrices:** Types of matrices, Symmetric, Hermitian, Skew-symmetric, Skew-Hermitian, Orthogonal matrices, Unitary matrices, Rank of a matrix by echelon form and normal form, Inverse of non-singular matrices by Gauss-Jordan method, System of linear equations - solving system of homogeneous and non-homogeneous equations, Gauss elimination method, Gauss-Seidel iteration method.

**UNIT -II**

**Eigen values and Eigen vectors:** Eigen values, Eigen vectors and their properties, Diagonalization of a square matrix, Cayley-Hamilton theorem (without proof) - Inverse and power of a matrix by Cayley-Hamilton theorem, Quadratic forms and nature of the quadratic forms, Reduction of quadratic form to canonical form by linear and orthogonal transformations.

**UNIT -III**

**Sequences &Series:**

**Sequence:** Definition of a sequence, Limit, Convergent, Divergent and oscillatory sequences.

**Series:** Definition of a series, Convergent, Divergent and Oscillatory Series, Series of positive terms, Comparison test, P-test, D-Alembert's ratio test, Raabe's test, Cauchy's integral test, Cauchy's root test, Logarithmic test. **Alternating series:** Leibnitz test, Alternating convergent series, Absolute and conditionally convergence.

**UNIT -IV**

**Calculus:**

**Mean value theorems:** Rolle's theorem, Lagrange's mean value theorem with their geometrical interpretation and applications, Cauchy's mean value theorem, Taylor's series, Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (only in Cartesian coordinates),

**Improper Integral:** Beta, Gamma functions and their applications.

**UNIT -V**

**Multivariable calculus (Partial Differentiation and applications):** Definitions of Limit and continuity, Partial differentiation, Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

**TEXT BOOKS:**

1. Higher Engineering Mathematics, (36th Edition), B.S. Grewal, Khanna Publishers, 2010
2. Advanced Engineering Mathematics, (9th Edition), Erwin kreyszig, John Wiley & Sons,2006.

**REFERENCE BOOKS:**

1. Advanced Engineering Mathematics (3rd edition) by R.K. Jain & S.R.K. Iyengar, Narosa Publishing House, Delhi.
2. Calculus and Analytic geometry, (9th Edition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.
3. A text book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2008.
4. Higher Engineering Mathematics, (11th Reprint), Ramana B.V., Tata McGraw Hill New Delhi, 2010.
5. Engineering Mathematics – I, T.K.V. Iyengar, B. Krishna Gandhi &Others, EditionS. Chand 2013 Yr.
6. Applied Mathematics for Engineers & Physicists (3rd 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 represented by matrices.
2. Obtain eigen values, eigen vectors and diagonalization of a square matrix.
3. Analyse the nature of sequence and series.
4. Verify mean value theorems & evaluation of improper integrals by using Beta and Gamma functions
5. Find maxima & minima of functions of several variables.

****END****

## (A30011) ENGINEERING CHEMISTRY

**B. Tech (CSE) I 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 $F_2$, $\pi$ −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- Nucleophilicsubstitutionreactions (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'sadditions, 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 (Paracetamoland 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, like batteries,fuel cells etc.Explain the chemical applications of electricity
3. Apply knowledge of corrosion science to problems in materials engineering, explain various methods of prevention of corrosion of metals.
4. Analyze microscopic chemistry in terms of atomic and molecular orbitals
5. List major chemical reactions that are used in the synthesis of drugs.

****END****

## (A30501) PROGRAMMING FOR PROBLEM SOLVING
## (Common to all branches)

| L | T | P | C |
|---|---|---|---|

**3 0 0 3**

**B. Tech (CSE) I Semester**

**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.

**Course Outcomes**

The student shall be able

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 and perform searching and sorting the data.

****END****

## (A30020) INTRODUCTION TO SOCIAL INNOVATION
## (Common for all branches)

**B. Tech (CSE) I Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

**UNIT 1**

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

**UNIT 2**

**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 3**

**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 4**

**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 5**

Steps forPatent filing and Startups, poster presentation.

**References:**

1. Social Entrepreneurship for the 21st Century: Innovation Across the Non Profit, Private and Public Sectors; Georgia Levenson Keohane; 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. Identify community issues through community Intearction
2. Illustrate the factors affecting social innovation in various sectors
3. Analyze the stages of scoial innovation for a community problem
4. Adopt the ethical values in implementing the Social innovation
5. Describe the process of property rights and patent filing.

**END**

## (A30002) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

**B. Tech (CSE) I Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**English Language Communication Skills Lab**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, learner comprehends, acquaints and adopts the following.

1. Illustrates How to Work in Teams and demonstrates Soft Skills and Communication Skills well.
2. Minimizes the usage of Mother Tongue and Apprises Neutral Accent
3. Prepares for employability skills
4. Speaks English Confidently and does Presentations with self-confidence
5. Distinguishes between Sympathy and Empathy

****END****

## (A30012) ENGINEERING CHEMISTRY LAB

**B. Tech (CSE) I 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 week acid vs a week base.
6. Potentiometric Titration of a strong acid vs a strong base.
7. Potentiometric Titration of week acid vs a week 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.

**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, pH of various solutions
4. Evaluate the viscosity and surface tension of liquids
5. Employ the conductometric and potentiometric titrations

**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.

****END****

## (A30314) ENGINEERING WORKSHOP

| B. Tech (CSE) I Semester | L | T | P | C |
|---|---|---|---|---|
| | 0 | 0 | 3 | 1.5 |

**I Trade for Exercise:**

(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- Turning on Lathe and other Operations on Lathe.,

**TEXT BOOK:**

**1.** Workshop Manual, Second edition/ P Kannaiahand K L Narayana/ Scitech publishers

**Course Outcomes**

On completion of the course students will be able to:

1. Design and model different prototypes in the carpentry trade such as Cross lap joint, Dove tail joint. and various basic prototypes in the trade of fitting such as Straight fit, V- fit etc.
2. make various basic prototypes in the trade of Tin smithy such as rectangular tray, and funnel
3. Perform various basic House Wiring techniques such as connecting one lamp with two switch, ceiling fan etc.
4. design and model various basic prototypes in the trade of Welding such as Lap joint, Butt joint etc
5. Design and model various basic prototypes in the trade of blacksmithy,foundry and plumbing.

**END**

## (A30502) C PROGRAMMING LAB
## (Common to all branches)

**B. Tech (CSE) I Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**Lab 1:** Familiarization with programming environment

i. Write a simple C program to display "Hello, World!" on the screen

ii Identify various parts in C program.

iii. Compile & Run the C- Program using various Compilers.

iv. Identify Syntax Errors and correct them.

**Lab 2:** Simple computational problems using arithmetic expressions

i.Write a C program to find the roots of a quadraticequation.

ii.Write a C program to convert centigrade toFahrenheit.

**Lab 3:**

i.Write a C program to find maximum of given threenumbers.

ii.Write a C program to find the factorial of a positiveinteger.

**Lab 4:**

i. Write a C program to determine if the given number is a prime number ornot.

ii. 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 $n^{th}$term.

**Lab 5:**

i. Write a C program to generate all the prime numbers between 1 and n, where n is avalue supplied by the user using Sieve of Eratosthenesalgorithm.

ii. Write a C program to convert a positive integer to a roman numeral. Ex. 11 isconverted toXI.

**Lab 6:**

i.Write a C program to print the Pascal trianglespyramid

ii.Write a C program to calculate the followingseries

a) Sin(x) b) Cos(x) c)log(x)

**Lab 7:**

i.Write a C program that reads two matrices and uses functions toperform the following:

a) Addition of two matrices b) Multiplication of two matrices
c) Transpose of aMatrix.

ii. Define four pointer variables, one each of type char, short, int, float. Fill these pointers by allocate memory of required size by calling malloc () function. Read data from the user and fill in the memory (allocated using malloc ()). Finally display the data

**Lab 8:**

i. Write a C program to read N students data (Rollo, Name, Marks1, Marks2, Marks3)and find the topper (Use array of structures and implement usingfunctions).

**Lab 9:**

i. 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.

ii. 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 binarynumber.

**Lab 10:**

i. Write a C program to display the contents of a file to standard outputdevice.

ii. Write a C program which copies one file to another, replacing all lowercasecharacters with their uppercaseequivalents

**Lab 11:**

i. Write a C program that uses non-recursive functions to count the number ofpalindromes in a givenstring.

ii. Write a C program to replace a substring with another in a given line oftext.

**Lab 12:**

i. Write C programs for implementing the followingmethods
   a. a) BubbleSort b) Selection Sort c) BinarySearch

**Additional Programs:**

1. Write a C program that implements the Insertion sort method to sort a given list of integers in ascendingorder.
2. Write a C program that uses functions to perform the followingoperations:
   i. To insert a sub-string into a given main string from a givenposition.
   ii. To delete n characters from a given position in a givenstring.
3. Write a C program to compare two files, printing the first line where theydiffer.
4. Write a C program to reverse the first n characters in a file. The file name and nare specified on the command line. Use fseek () function
5. Write a C program to merge two files into a third file (i.e., the contents of the firstfile 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, CengageLearning, (3rdEdition)
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 (16thImpression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, PearsonEducation.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4thEdition

**Course outcomes**

The student shall be able

1. To test and execute the programs and correct syntax and logical errors.

2. To implement conditional branching, iteration and recursion.
3. To use arrays and structures to formulate algorithms and programs.
4. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
5. Create, read and write to and from simple text and binary files and verifythrough execution.

**END**

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

**B. Tech (CSE) II Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**UNIT-I**

**First Order ODE:** Exact, Linear and Bernoulli's differential equations, Applications, Newton's law of cooling, Law of natural growth and decay.

**Equations not of first degree:** Equations solvable for p, Equations solvable for y, Equations solvable for x and Clairaut's type.

**UNIT -II**

**Ordinary Differential Equations of Higher Order:** Second and higher order linear differential equations with constant coefficients, Non-Homogeneous terms of the type $e^{ax}, \sin ax, \cos ax,$ polynomials in $x$, $e^{ax}V(x)$ and $x\,V(x)$, Method of variation of parameters, Equations reducible to linear ODE with constant coefficients, Legendre's equation, Cauchy-Euler equation.

**UNIT -III**

**Multivariable Calculus (Integration):** Evaluation of Double Integrals (Cartesian and polar coordinates), Change of order of integration (only Cartesian form), Evaluation of Triple Integrals, Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals, **Applications:** Areas (by double integrals) and volumes (by double integrals and triple integrals).

**UNIT -IV**

**Vector Differentiation:** Vector point functions and scalar point functions, Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

**UNIT -V**

**Vector Integration:** Line, Surface and volume Integrals. Theorems of Green's, Gauss and Stoke's(without proofs) and their applications.

**TEXT BOOKS :**

1. Higher Engineering Mathematics, (36th Edition), B.S. Grewal, Khanna Publishers, 2010

2. Advanced Engineering Mathematics, (9th Edition), Erwin kreyszig, John Wiley & Sons,2006.

**REFERENCE BOOKS:**

1. Advanced Engineering Mathematics (3rd edition) by R.K. Jain & S.R.K. Iyengar, Narosa Publishing House, Delhi.
2. Differential Equations with Applications & Historical Notes(2nd Edi) by George F Simmons, Tata Mc. graw Hill Publishing Co Ltd.
3. Advanced Engineering Mathematics(8th Edition) by Kreyszig, John Wiley & Sons Publishers
4. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry(9th Edition), Pearson, Reprint, 2002
5. Mathematics for Engineering and Scientists (6th Edi), by. Alan Jeffrey, 2013, Chapman & Hall / CRC
6. Engineering Mathematics – I by T.K.V. Iyengar, B. Krishna Gandhi & Others, 2012 Yr. Edition S. Chand.
7. Differential Equations (3rd Ed), S. L. Ross Wiley India, 1984.

**COURSE OUTCOMES:**

On completion of the course students will be able to

1. Determine first order differential equations and obtain solutions.
2. Solve higher order linear differential equations using various methods.
3. Evaluate areas and volumes using multiple integrals.
4. Evaluate Gradient, Divergence, Curl and directional derivatives.
5. Evaluate integrals by converting line to surface integral and surface to volume integrals.

****END****

**(A30009) APPLIED PHYSICS**
**(ECE, EEE, CSE)**

| L | T | P | C |
|---|---|---|---|

**B. Tech (CSE) II Semester** **3 1 0 4**

**UNIT-I**

**Principles of Quantum and Statistical Mechanics:** Waves and particles, de-Broglie hypothesis-Matterwaves, Davisson and Germer's Experiment, Heisenberg's Uncertainty principle, Physical significance of the wave function- (qualitative treatment) Schrödinger's time dependent and time independent wave equations, Particle in a one dimensional potential box- equations for energy and wave function,Concept of electron gas,Maxwell-Boltzmann, Bose –Einstein and Fermi–Dirac statistics(qualitative treatment). Density of energy states, Estimation of Fermi energy.

**UNIT-II**

**Semiconductor Physics:** Classification of materials into Conductors, Semiconductors &Insulators.Intrinsic semiconductors-Concentration of electrons in the conduction band &concentration of holes in the valance band, Fermi level in intrinsic semiconductors,Law of mass action,Extrinsic semiconductors, N-Type semiconductor, Carrier concentration in N-Type semiconductors, P-Type semiconductors, Carrier concentration in P-Type semiconductors, drift and diffusion current,Hall effect.

**UNIT-III**

**Physics of Semiconductor Devices:** Formation of PN junction, Open circuit PN junction, Energy diagram of PN diode, I-V Characteristics of PN junction diode, Zener diode –breakdown mechanism and characteristics.

Radiative and Non-Radiative recombination, LED, Photo diode &Solar cell-working principle & Applications, Semiconductor photo detectors- PIN and Avalanche structure and their characteristics.

**UNIT-IV**

**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-V**

**Dielectric Properties:** Electric dipole, Dipole moment, Relative permittivity, Polarization and polarizability, Electric susceptibility, Displacement vector, Electronic and Ionic polarization, Orientation polarization (qualitative treatment), Internal fields in solids, Clausius–Mossottiequation, 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 curveon the basis ofDomain theory of Ferro magnetism.

**Superconductivity:** Introduction, Critical field, Meissner effect, Effect of Magnetic field, Type-I and Type-II Superconductors, Cooper pair, BCS Theory of superconductivity (Qualitative treatment), Applications of Superconductors

**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.

**REFERENCES**

1. Fundamentals of Physics by Halliday, R. Resnick and J. Walker,John Wiley and Sons,6th edition, 2001.
2. Introduction to Quantum PhysicsbyEisberg and Resnick, John Wiley & Sons, 2nd edition, 1985.
3. Quantum mechanics by D.J Griffiths, Cambridge University press,2nd edition, 2017.
4. Principles of Lasers by O.Svelto, Plenum publishing Corporation,4th edition,1998.
5. Physics of Semiconductor devices by Simon.MSze and Kwok K . Ng, Wiley Student Edition,3rd edition,2006.

**COURSE OUTCOMES**

On completion of the course students will be able to:

1. Explain the basic concepts of quantum & statistical mechanics.
2. Describe the classification of solids and the properties of semiconductors. for device designing.
3. Understand the different semiconductor devices and circuits for optical communication
4. Interpret the basic properties of lasers and characteristics of optical fibers for modern communication
5. Aquaire knowledge on properties of dieectric,,magnetic materials & illustrate the basic principles of superconductivity.

**END**

**(A30503) DATA STRUCTURES & ALGORITHMS**

**(Common to ECE, CSE, EEE, IT)**

**B. Tech (CSE) II Semester**

| L | T | P | C |
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**UNIT - I**

**Data Structures:** Introduction, classification of Data structures, ADT and applications, Over view of List and its operations.

**Linked Lists**: Representation in memory, Operations of Singly Linked List: Traversing, Searching, Insertion, Deletion and Reverse, Doubly Linked List and its Operations, Circular Linked Lists and its Operations.

**UNIT - II**

**Stacks**: Stack ADT and its implementations, Applications of Stacks: Infix to Postfix Conversion and Postfix evaluation – Corresponding algorithms.

**Queues:** Queue ADT and its implementations, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each type of Queues- Corresponding Algorithms.

**UNIT - III**

**Trees**: Basic Tree Terminologies, Representations, types of Binary Trees: Threaded Binary Tree, Binary Search Tree, AVL Tree and their operations: Insertion Deletion, Traversal.

**UNIT – IV**

**Graphs**: Basic Terminologies, Representations, Graph traversal algorithms.

**Dictionaries:** Dictionary as a linear list and its operations-Insertion, Deletion, Searching, Hash tables, Hash Functions, Collision Resolution Techniques-Linear Probing, Quadratic Probing, and Double Hashing.

**UNIT V**

**Sorting:** Quick Sort, Merge Sort, Heap Sort, comparison of techniques.

**Pattern Matching Algorithms**: Brute-Force Algorithm and Knuth-Morris-Pratt Algorithm.

**Text books:**

1. Ellis Horowitz, Sartaj Sahni, Fundamentals of Data Structures in C, Second Edition Universities Press.
2. Thomas H. Cormen Charles E. Leiserson, Introduction to Algorithms, PHI Learning Pvt. Ltd. Third edition.

**Reference books:**

1. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
2. E.Balagurusamy Data Structures Using C, McGraw Hill Education; First edition

**Course Outcomes:**

On completion of the course students will be able to

1. Use data structure concepts for realistic problems.
2. Identify appropriate data structure for solving computing problems in respective language
3. Develop algorithms, operations on queues, stacks and Linked Lists.
4. Demonstrate the representation and traversal techniques of graphs and their applications
5. Analize and Implement searching and sorting algorithms

**END**

## (A30313) ENGINEERING DRAWING

**B. Tech (CSE) II Semester**

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 3 | 2.5 |

**Unit – I**

**Introduction to Engineering Drawing:** Principles of Engineering Drawing and their Significance; Conic Sections (Using eccentricity method only) Cycloid, Epi cycloid and Hypocycloid.

**Unit – II**

**Orthographic Projections:** Principles of Orthographic Projections – Conventions – Projections of Points and Lines (Excluding traces of lines) Projections of Plane regular geometric figures. (Excluding Auxiliary Planes and traces of planes)

**Unit – III**

**Projections of Solids:** Projection of regular solids- cube, Cylinder, prisms, pyramids, cone (Excluding Auxiliary Planes).

**Unit-IV**

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

**Unit-V**

**Transformation of Projections**: Conversion of Isometric Views to Orthographic Views and Vice-versa.

**Text Books:**

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education.

**Reference Books:**

1. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
2. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

**Course Outcomes**

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

1. Understand and 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.

**END**

## (A30023) APPLIED PHYSICS LAB

**B. Tech (CSE) II Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**(Any 8 experiments are to be performed)**

1. Energy gap of P-N junction diode: To determine the energy gap of a semiconductor diode.
2. Solar Cell:To study the V-I Characteristics of solar cell.
3. Light emitting diode: Plot V-I and P-I characteristics of light emitting diode.
4. Stewart – Gee's experiment: Determination of magnetic field along the axis of a current carrying coil.
5. Hall effect: To determine Hall co-efficient of a given semiconductor.
6. Photoelectric effect: To determine work function of a given material.
7. LASER: To study the characteristics of LASER sources.
8. Optical fibre: To determine the Numerical aperture of a given fibre and bending losses of Optical fibres.
9. LCR Circuit: To determine the Quality factor of LCR Circuit.
10. Diffraction grating: Determination of wavelength of a source (LASER).
11. Determination of Planck's constant using LED.
12. R-C Circuit: To determine the time constant of R-C circuit.

**LABORATORY MANUAL:**

1. Laboratory Manual of Engineering Physics by Dr.Y. Aparna&Dr.K. VenkateswaraRao (V.G.S Publishers).
2. Laboratory Manual of Engineering, Published by CMR College of Engineering & Technology

**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.

**END**

## (A30504) DATA STRUCTURES & ALGORITHMS LAB

**(Common to ECE, CSE, EEE, IT)**

**B. Tech (CSE) II Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**Lab 1:** Write a C program to perform the following operations on the givenarray

(i) Insert element in specific position in toarray

(ii) Delete random element fromarray

(iii) Reverse the arrayelements

**Lab 2:** A) Write a C program to implement Single linkedlist

i) Insertion ii)Deletion iii)Display

B) Write a C program to implement Circular linkedlist

i) Insertion ii) Deletion. iii)Display

**Lab 3:** A) Write a C program to implement Doubly linkedlist

i) Insertion ii) Deletion. iii)Display

B) Write C programs to implement Stack ADTusing

i)Array ii) LinkedList

**Lab 4:**

A. Write a C program that uses stack operations to convert a given infix expression in to its postfix equivalent. (Display the role ofstack).

B. Write a C program for Evaluation of postfixexpression.

.

**Lab 5:** Write C programs to implement Queue ADT using

i) Array ii) Linked List

**Lab 6:**Write a C program to implement Binary search tree

i) Insertionii) deletioniii) Traversals

**Lab 7:**

Write a C program to implement binary search tree Non - recursively traversals

i) Pre- Order ii) Post –Order iii) In-Order

**Lab 8:**

(A) Write a C Program to Check if a Given Binary Tree is an AVL Tree or Not

(B) Write a C program to find height of a Binary tree

(C) Write a C program to count the number of leaf nodes in a tree.

**Lab 9:**

Write a C program for implementing Graph traversal
i) DFS ii) BFS

**Lab 10:**

A) Write a C program to implement different hash methods

B) Write a C program to implement the following collisionresolving
i) Quadratic probing. ii) Linear Probing

**Lab 11:**

Write C programs for implementing the following Sorting methods and display the important steps.
i) Quick Sort ii) Heap sort

**Lab 12:**

Write a C program for implementing pattern matching algorithms
i) Knuth-Morris-Pratt ii) Brute Force

**Additional**

1. Implement the priority queue using Heap
2. Write a C Program to Implement Merge sort
3. Write a C program to implement AVL tree
   i) Creation ii) Deletion iii) Traversals
4. Write a function to reverse the nodes of a linked list
5. Write a C program to implement 2-3-4 tree operations
6. Write a C program to implement B tree operations
7. Write a C program to implement B+ tree operations

**Reference Books:**

1. Ellis Horowitz, Sartaj Sahni, Fundamentals of Data Structures in C, Second Edition Universities Press.
2. Thomas H. Cormen Charles E. Leiserson, Introduction to Algorithms, PHI Learning Pvt. Ltd. Third edition.
3. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
4. E.Balagurusamy Data Structures Using C, McGraw Hill Education; First edition

**Course Outcomes**

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

1. Write and execute C-programs to implement Linked List Data Structures
2. Evaluate postfix expressions by implementing in C-language
3. Implement Non- linear Data Structures in C-language
4. Implement various sorting techniques in C-language
5. Test various pattern matching algorithms by implementing in C-language.

**END**

**(A30505) BASIC INTERNET OF THINGS LAB**
**(Common to all branches)**

**B. Tech (CSE) II Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

**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 of IoT
- Introduction to Basic Components

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

**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 DependantResistor (LDR))

**Additional Experiments (optional)**

Experiment 1: To interface the Liquid Crystal Display (LCD) with the Raspberry Pi3 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 Raspberry Pi3 to determine the distance of an object from the sensor.

**Additional Experiments (optional)**

Experiment1: To interface the Infrared sensor with the Raspberry Pi3 to sense the path is clear/indicate the presence of any obstacles.

**Week 7:** Introduction to Android

- Introduction to Android
- Explain the structure of Android App.

**Experiment 1:** Create Hello World application with Android.

**Week 8**

**Experiment 1**: Create Application to change the Background Color and Background Image
**Experiment 2**: Explain simple User interface components in Android and create simple Application

**Week 9**
**Experiment 1**: Create an application that display color or image as background when selected the radio buttons or checkboxes
**Experiment 2**: Create an Application to perform addition, Subtraction, multiplication, division.

**Week 10**

Explain what is activity, intent and its functions.
**Experiment 1:** Create an application with Android intent.

**Week 11**

**Experiment 1:** Create a simple android application with the following event handlers.

a) On Click
b) On Key Down
c) On Focus changed

**Week 12**

**Experiment 1:** Explain about Toast, Create Application with User defined Toast Notifications.
**Additional Experiment:** 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

**END**

## (A30019) ENGINEERING EXPLORATION & PRACTICE
## (Common to all branches)

**B. Tech (CSE) II Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**Module 1**

**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 2**

**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 3**

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

**Module 4**

**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 5**

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

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

**References**:


1. Engineering Fundamentals: An Introduction to Engineering (MindTap Course List) 5th Edition by Saeed Moaveni
2. Software Project Management (SIE), (Fifth Edition); Bob Hughes,MikeCotterell,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 importance of engineering profession in the world.
2. Identify multi-disciplinary approach required in solving an engineering problem
3. "Build a mechanism for a given application"
4. Design a mechatronic system using arduino and electronic components
5. Analyze engineering solution from sustainability perspectives.

**END**

## (A30506) DISCRETE MATHEMATICS

**B. Tech (CSE) III Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Unit-I**

Sets, Relations and Functions: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.

**Unit-II**

**Principles of Mathematical Induction:** The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic. Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination.

**Unit-III**

**Propositional Logic**: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

**Unit-IV**

**Algebraic Structures and Morphism:** Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form

**Unit-V**

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Coloring, Coloring maps and Planar Graphs, Coloring Vertices, Coloring Edges, List Coloring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.

**Text books:**

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, 7$^{th}$Edition, Tata McGraw – Hill
2. Susanna S. Epp, Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co. Inc.
3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer OrientedApproach, 3rd Edition by, Tata McGraw – Hill.

**Reference books:**

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application toComputer Science", TMG Edition, TataMcgraw-Hill
2. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
3. Discrete Mathematics, Tata McGraw – Hill

**Course Outcomes**

**On completion of the course students will be able to**

1. Identify various types of Sets, Relations and Functions.
2. Apply Principle of Inclusion and Exclusion technique.
3. Describe various methods of Proving a logical statement.
4. Classify various Algebraic Structures.
5. State the properties of Graphs & Trees.

****END****

**(A30461) ANALOG & DIGITAL ELECTRONICS**

**B. Tech. (CSE) III-Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Unit-I:P-N Junction Diode**

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). Transition and Diffusion Capacitances, Diode Equivalent Circuits, Load Line Analysis, Breakdown Mechanisms in Semiconductor Diodes, Zener Diode Characteristics.

**Diode Applications:** Operation of Diode Rectifiers (Half Wave, Full Wave & Bridge) and Zener Voltage Regulator.

**Unit –II: Bipolar Junction Transistor and UJT**

The Junction Transistor-Current Components, Construction & Operation, Configurations-Common base, Common Emitter and Common Collector. Comparison of CB, CE and CC characteristics, Transistor biasing, Transistor as an amplifier, UJT operation &its Characteristics.

**Unit- III: Field Effect Transistor and Number Systems**

The Junction Field Effect Transistor (Construction & principle of operation), Volt-Ampere characteristics, MOSFET (Construction & principle of operation), MOSFET Characteristics in Enhancement and Depletion modes.

**Number Systems:** Introduction toNumber Systems, Base Conversion Methods, Complements of numbers, Codes – binary codes, Binary Coded Decimal code and its properties, Gray Code, Alpha Numeric Codes, Error Detecting and Correcting Codes.

**Unit- IV: Boolean Algebra and Combinational Circuits**

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, The Minimization of Boolean functions, Karnaugh Map method –four and five variable maps, Prime and Essential Implications, Don‘t Care Map Entries

**Combinational Circuits:** Introduction, Arithmetic Circuits, Code-converters, Comparator, Multiplexer, Decoder and Encoder.

**Unit- V: Sequential Circuits Design**

Types of Flip Flops- SR, JK, D and T. Realization using Flip-Flops.ripple counter, synchronous counter, shift register, ring counter using shift register. Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines.

**Text Books**

1. Millman's Electronic Devices & Circuits-J. Millman, C.C. Halkais&Satyabrata Jit, 2 Ed., 1998, TMH.
2. Digital Design -Morris Mano, PHI, 3rd Edition, 2006.

**Reference Books**

1. Integrated Electronics- J. Millman and Christos C. Halkais, 1991 Ed., 2008, TMH.
2. Electronic Devices and Circuits- R.L. Boylstad and Louis Nashelsky, 9 Ed., 2006, PEI/PHI
3. Electronic Devices and Circuits- K. Lal Kishore, 2 Ed., 2005, BSP.
4. Introduction to switching design and logic design - Fredriac J. Hill, Gerald R. Peterson, 3rd ED, John Wiley & Sons Inc.
5. Digital fundamentals – A Systems approach-Thomas L. Floyd, Pearson, 2013.
6. Digital logic design- Ye Brian and Holds Worth, Elsevier.

**Course Outcomes**

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

1. Analyze the characteristics of different diodes and its applications.
2. Distinguish the characteristics of BJT, UJT.
3. Distinguish the characteristics of JFET , MOSFET & Identify the various Number systems .
4. Apply the basic theorems,minimization techniques to simply the Boolean Functions and also design various combinational circuits
5. Design simple Sequential Circuits.

**END**

## (A30513) COMPUTER ORGANIZATION & ARCHITECTURE

**B. Tech (CSE) III Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**Unit-1**

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU – registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs

**Unit-II**

Data representation: signed number representation, fixed and floating-point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and-add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic.

**Unit-III**

Introduction to x86 architecture. CPU control unit design: hardwired and micro-programmed design approaches, Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers – program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces – SCII, USB

**Unit-IV**

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards. Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency

**Unit-V**

Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

**Text books:**

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
2. "Computer Organization and Embedded Systems", 6th Edition by CarlHamacher, McGraw Hill Higher Education.

**Reference books:**

1. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw- Hill
2. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
3. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

**Course Outcomes**

**On completion of the course students will be able to**

1. Describe basic computer organization
2. Explain the design of Control Unit.
3. Illustrate Data representation in computer's memory
4. Describe Input-Output, Memory Organization.
5. Distinguish between RISC and CISC Instruction Set.

**END**

## (A30507) OBJECT ORIENTED PROGRAMMING

**B. Tech (CSE) III Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**Unit-I**

Introduction to Object Oriented Programming: Need for Object Oriented Programming - Characteristics of Object-Oriented Languages, Objects, Overloading, Overriding Functions and Object Polymorphism, Inheritance, Abstraction, Interfaces, java introduction & language fundamentals

Packages: Defining, Creating and Accessing a Package, Understanding Class path, Importing Packages

**Unit-II**

Inner Classes: Use of Inner Classes, Local Inner Classes, Anonymous Inner Classes, Static Inner Classes, Example.

Exception Handling: Dealing with Errors, Benefits of Exception Handling, The Classification of Exceptions, Exception Hierarchy, Checked Exceptions and Unchecked Exception, Usage of Try, Catch, Throw, Throws, and Finally, Re-Throwing Exceptions, Exception Specification, Built in Exceptions, Creating Own Exception Sub Classes.

**Unit-III**

Multithreading: Difference Between Multiple Processes and Multiple Threads, Thread States, Creating Threads, Interrupting Threads, Thread Priorities, Synchronizing Threads, Inter-Thread Communication, Producer Consumer Pattern.

File I/O: Streams-Byte Streams, Character Streams, Text Input /Output, Binary Input/output, File Management using File Class

**Unit-IV**

Collection Framework in Java: Introduction to Java Collections, Overview of Java Collection Frame Work, Generics, Commonly used Collection Classes-Array List, Vector, Hash Table, Stack, Enumeration, Iterator, String Tokenizer, Random, Scanner, Calendar and Properties.

Connecting to Database: JDBC Type I To IV Drivers, connecting to a Database, querying a Database and Processing the Results, Updating Data With JDBC.

**Unit-V**

GUI Programming with Java: Introduction to Scala and Swing, Hierarchy for Swing and Scala Components, ContainersJFrame, JApplet, JDialog, JPanel, Overview of Some Swing Components, JButton, JLabel, JTextfield, JTextarea, Simple Swing Applications, Layout Management- Layout Manager Types- Border Grid and Flow. Event Handling: Events, Event Sources, Event Classes, Event Listeners, Relationship Between Event Sources and Listeners, Delegation Event Model, Examples: Handling a Button Click, Handling Mouse Events, Adapter Classes.

**Textbooks**

1.Java Fundamentals: A Comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.

2.Programming Development in Java, BarbaraLiskov, Addison-Wesley

**References**

**1.** Data Abstraction and Problem Solving with Java: Walls and Mirrors by Frank M. Carrano and Janet J. Prichard

2. Java for Programming, P.J. Dietel Pearson Education

3. Object Oriented Programming through Java, P. Radha Krishna, and Universities Press.

4. Thinking in Java, Bruce Eckel, Pearson Education

5. Programming in Java, S. Malhotra and S. Choudhary, Oxford University Press

**Course Outcomes**

**On completion of the course students will be able to**

1. Describe the characteristics of Object-Oriented Programming Languages.
2. Illustrate Java Exception Handling Mechanism
3. Develop applications using Java Multi-Thread Concept.
4. Use Java Collection Framework
5. Design GUI applications using Java Swings.

**END**

## (A30509) DATABASE MANAGEMENT SYSTEMS

**B. Tech (CSE) III Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**Unit-1:**

**Database System Applications**: Database system vs file system, view of data, data abstraction, instances and schemas, data models, the ER model, relational model, other models, database languages, DDL, DML, database users and administrator, transaction management, database system structure, storage manager, the query processor, data base design and ER diagrams, beyond ER design entities, attributes and entity sets, relationships and relationship sets, additional features of ER model, concept design with the ER Model

**Unit-2:**

**Introduction to the Relational Model:** Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying, altering tables and views.

Form of basic SQL query, examples of basic SQL queries, introduction to nested queries, correlated nested queries, set comparison operators, aggregation operators, NULL values, comparison using null values, logical connectivity's, AND, OR and NOT, impact on SQL constructs, outer joins, disallowing NULL values

**Unit-3:**

**Relational Algebra**: Selection and projection, set operations, renaming, Joins, Division, Examples of Algebra overviews, Relational calculus, Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and calculus. Schema refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, dependency preserving decomposition, schema refinement in database design, multi valued dependencies, FOURTH normal form, FIFTH normal form.

**Unit-4:**

**Transactions:** Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity.

**Unit-5:**

**Storage:** Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based

Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

**Text Books:**

1."Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

2." Database Management Systems",3rd Edition by Johannes Gehrke and Raghu Ramakrishnan, McGraw-Hill.

**Reference Books:**

1 "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science press.

2 "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education.

3 "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley.

**Course Outcomes**

**On completion of the course students will be able to**

1. Explain the significance of Database Management Systems.
2. Write SQL queries to interact with RDBMs
3. Describe various Normal Forms of Relations.
4. Evaluate various concurrency control protocols
5. Classify Indexing Techniques based on prime attributes.

****END****

## (A30508) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

**B. Tech (CSE) III Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 4 | 2 |

**Week 1:**

1. Write a java program that works as a simple calculator for the +,-,*,/,% operations using classes and objects in java.
2. Write a java program to find result of a given arithmetic expression? (EX: if you given arithmetic expression like 10+20-24*4/2-4.5= it should print 7.5)

**Week 2:**

3. Write a program to demonstrate the following
i) Super, Final ii) Single inheritance iii) Multi –level inheritance
4. Write a program to demonstrate the usage of method overriding, calling super class constructor in derived class.

**Week 3:**

5. Write a java program to create an abstract class named **shape** that contains two integers and an empty method named printarea (). Provide three classes named Rectangle, Triangle and Circle such that each one of these classes extends the class Shape. Each one of the classes contains only the method printarea () that prints the area of the given shape.

**Week 4:**

6. Write a program to demonstrate method overloading and constructor overloading.
7. Write a program to demonstrate polymorphism using interface (interface in package P1 and class in package P2)

**Week 5: Exception handling in java**

8. Implement pre-defined exceptions
9. Implement user defined exceptions

**Week 6:**

10. Develop a scala and swing component in java that displays a simple message.

11. Write a java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, num1 and Num2. The division of Num1 and Num2 is displayed in the result fields when the division button is clicked. If Num1 or Num2 were not an integer, the program should throw a Number Format

Exception. If Num2 were Zero the program should throw an Arithmetic Exception. Display the exception in a message dialog box.

**Week 7:**

12. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second. if the generated value is even, second thread computes the square of the number and prints. If the generated value is odd, the third thread will print the value of cube of the number

**Week 8:**

13. Write a java program to demonstrate Generic class and generic methods
14. Write a java to perform string operations using sting buffer class and its methods.

**Week 9:**

15. Write a java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with ―Stop‖ or ―ready‖ or ―Go‖ should appear above the buttons in selected color initially, there is no message shown.

**Week 10:**

16. Write a java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab(\t). it takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).

**Week 11:**

17. Write a java program that connects to a data base using JDBC and does add, delete, modify and retrieve operations.

**Week12**

18. Implement the week 10 program with database instead of a text file.
19. Write a java program that takes tab separated data (one record per line) from a text file and inserts them into a database.

**Textbooks**

1. Java Fundamentals- A Comprehensive introduction, Herbert schildt and Dale skrien, TMH.
2. Programming Development in Java, Barbara Liskov, Addison-Wesley

**References**

1. Java for programming, P.J. Dietel Pearson education (OR) Java: How to Program P.J. Dietel and H.M. Dietel, PHI
2. Data Abstraction and Problem Solving with Java: Walls and Mirrors by Frank M. Carrano and Janet J. Prichard
3. Object Oriented Programming through java, P. Radha Krishna, Universities Press.
4. Thinking in Java, Bruce Eckel, Pearson Education
5. Programming in Java, S. Malhotra and S. Choudhary, Oxford University Press

**Course Outcomes**

**On completion of the course students will be able to**

1. Write & execute programs using JAVA Programming Language Syntax
2. Use Java API functions to write and execute programs for problem solving.
3. Demonstrate the usage of Java Exception handling mechanisms.
4. Write and execute Java applications using Java String Buffer Class
5. Design Java Applications using JAVA GUI components and test them by execution.

****END****

## (A30510) DATABASE MANAGEMENT SYSTEMS LAB

**B. Tech (CSE) III Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**Week-1: Working with DDL, DML, DCL and Key Constraints**
(Creation, Altering and Dropping of Tables and Inserting Rows into a Table (Use Constraints While Creating Tables) Examples Using Select Command.)

**Week-2: Working with Queries and Nested QUERIE**S
(Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints)

**Week-3**: Working **with Queries USING Aggregate Operators & views**
Queries using Aggregate Functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and Dropping of Views

**Week-4: Working with Conversion Functions & String Functions**
Queries using Conversion Functions (to_char, to_number and to_date), String Functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), Date Functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)

**Week-5**: Working **with Triggers using PL/SQL**
Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

**Week-6: Working with PL/SQL Procedures**
Programs Development using Creation of Procedures, Passing Parameters IN and OUT of PROCEDURES.

**Week-7: Working with LOOPS using PL/SQL and Exception Handling**
Program Development using WHILE LOOPS, Numeric FOR LOOPS, Nested Loops using ERROR Handling, BUILT-IN Exceptions, USE Defined Exceptions, RAISE- APPLICATION ERROR

**Week-8: Working with Functions Using PL/SQL**
Program Development using Creation of Stored Functions, Invoke Functions in SQL Statements and Write Complex Function

**Week-9: Working with CURSORS**
Develop Programs using Features Parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of Clause and CURSOR Variables

**Week-10: Working with PL/SQL Packages**
Program development using Packages.

**Week-11: Case Study-I**
Design & Implementation of Library Management System

**Week-12: Case Study-II**
Design & Implementation of Hospital Management System

**Reference books:**

1. Oracle PL/SQL by Example, Benjamin Rosenzweig, Elena Silvestrova, Pearson Education 3rd Edition
2. Oracle Database LogG PL/SQL Programming, Scott Urman, Tata Mc-Graw Hill.
3. SQL and PL/SQL for Oracle 10g, Black Book, Dr .P.S. Deshpande.

**Course Outcomes**
**On completion of the course students will be able to**

1. Demonstrate the usage of SQL statements for the creation, manipulation of data in the Database.
2. Write & execute queries on the given Database
3. Write & Execute PL/SQL programs for a given application
4. Develop & Demonstrate the usage of Cursors in PL/SQL
5. Design & Implement a given Enterprise Database

****END****

## (A30021) SOCIAL INNOVATION IN PRACTICE

**(Common for all branches)**

**B. Tech (CSE) III Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

**UNIT 1**
Identify community issues to be addressed, Requirements Analysis: Extensive User requirements analysis, Generating effective System Requirement document.

**UNIT 2**
Social Innovation – Case Studies
Presentation of the case studies with a focus on impact and vision on society.

**UNIT 3**
Process of Social Innovation
Prompts – identifying needs, Proposals – generating ideas, Prototyping – testing the idea in practice,

**UNIT 4**
Sustaining-developing a business model, Scaling and diffusion-growing social innovations, Systematic change.

**UNIT 5**
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, YeheskelHasenfeld; 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. Identify several social issues to be addressed
2. Analyse the impact of social innovations on the society
3. Analyze the process of scoial innovation for a community problem
4. Develop a scalable business model.
5. Analyse the feasibility and economical factors

**END**

## (A30015) SOFT SKILLS & PROFESSIONAL ETHICS

**B. Tech (CSE) III Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 0 |

**UNIT-I:**
**Business Communication Skills:**
English Language Enhancement the Art of Communication.

**UNIT-II:**
**Intrapersonal & Interpersonal Relationship Skills:**

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

**UNIT-III:**
**Campus to Company:**

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

**UNIT-IV:**
**Group Discussions, Interviews and Presentations:**

- Group Discussions
- Interviews
- Presentations

**UNIT-V:**
**Entrepreneurial Skills Development:**

- Goal Setting
- Entrepreneurial Skills – Awareness and Development

**REFERENCES**

1. UNLEASH the power within Soft Skills – Training Manual (Infosys Campus Connect)

**Course Outcomes**

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

1. Express themselves with proper pronunciations and sentence construction
2. Demonstrate a strong teamwork and be a team player
3. Develop a strong personal etiquette
4. Demonstrate good leadership qualities
5. Recognize and identify basic English grammar

**END**

**(A30007) NUMERICAL TECHNIQUES & PROBABILITY DISTRIBUTIONS**
**(Common to CE, ME, CSE, IT)**

| **B. Tech (CSE) 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 ($\sigma$ - 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 (36th edition) by B.S. Grewal, Khanna Publishers.
2. Fundamentals of Mathematical Statistics (11th Edition) by S.C. Gupta& VK Kapoor, Sultan Chand & Sons.

**REFERENCE BOOKS:**

1. Advanced Engineering Mathematics (3rd 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 (9th 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 (3rd edition) by Pipes & Harvill, McGraw Hill Internation Book company.

**COURSEOUTCOMES:**

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.

**END**

## (A30511) DESIGN AND ANALYSIS OF ALGORITHMS

| | L | T | P | C |
|---|---|---|---|---|
| **B.Tech (CSE) IV Semester** | **3** | **1** | **0** | **4** |

**Unit-I**

Introduction: Characteristics of algorithm, Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior;

Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

**Unit-II**

Fundamental Algorithmic Strategies – I: Divide and Conquer, Greedy, and Dynamic Programming, methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving, Strassen's Matrix Multiplication, Bin Packing, job sequencing with deadlines, Huffman codes, Knapsack, OBST, Matrix chain multiplication, TSP.

**Unit-III**

Fundamental Algorithmic Strategies – II: Branch and Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving, N-Queens, 0/1 Knapsack, TSP, Sum of sub sets, Graph coloring, Hamiltonian cycle.

**Unit-IV**

Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

**Unit-V**

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Game tree, min-max search Standard NP-complete problems and Reduction techniques.

**Text books:**

1. Fundamentals of Algorithms – E. Horowitz et al.
2. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.

**Reference books:**

1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.
3. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

**Course Outcomes**

**On completion of the course students will be able to**

1. Explain various asymptotic notations to measures the performance of an algorithm
2. Discuss algorithms design strategies
3. Apply Graph & Tree algorithms for real world applications
4. Describe various computability Classes
5. Illustrate P & NP –Type Problems

****END****

## (A30525) SOFTWARE ENGINEERING

| | L | T | P | C |
|---|---|---|---|---|
| **B. Tech (CSE) IV Semester** | **3** | **0** | **0** | **3** |

**Unit-I**

Introduction to Software Engineering: The evolving role of software, changing nature of software, A Generic view of process: Software engineering- a layered

technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, Process models: The waterfall model, incremental process models, evolutionary process models, the unified process. Agile process, Agile process models.

**Unit-II**

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document. Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management. System models: Context models, behavioral models, data models, object models, structured methods

**Unit-III**

Design Engineering: Design process and design quality, design concepts, the design model,
Architectural Design Styles and patterns. Conceptual model of UML, basic structural modeling, use case diagrams, class diagrams, sequence diagrams, collaboration diagrams, component diagram

**Unit-IV**

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging. Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

**Unit-V**

Estimation: observations on estimation, the project planning process, Empirical estimation models. Risk management: Reactive Vs proactive risk strategies, Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, Change Management: software configuration management, The SCM Repository, The SCM Process.

**Text Books:**

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition,
   Mc Graw Hill International Edition.
2. Software Engineering-Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

**References:**

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiely.
2. Software Engineering principles and practice- Waman SJawadekar, The Mc Graw-Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education

**Course Outcomes**

**On completion of the course students will be able to**

**On completion of the course students will be able to**

1. Identify the need to engineer a software system
2. Choose appropriate process model to develop a software system
3. Analyze customer requirements and prepare Software Requirement Specification (SRS)
4. Design software system for the given SRS using appropriate design methodology
5. Perform test planning and test execution for a given system using relevant techniques

****END****

## (A30228) BASIC ELECTRICAL ENGINEERING

**B. Tech (CSE) IV Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**UNIT-1**

**DC Circuits**: Circuit Concept–R-L-C parameters–Voltage and Current sources Ohm's law ,Kirchhoff's laws, types of sources, source transformations, V-I relation

for passive elements ,series parallel circuits, star- delta and delta –star transformations, mesh and nodal analysis, network theorems –super position, thevenin's, maximum power transfer theorem, simple problems.

**UNIT-2**

**AC Circuits**: Representation of sinusoidal waveforms, waveforms and basic definitions, RMS and Average values of the alternating quantity, form factor and peak factor, phasor representation of alternating quantities, the 'j' operator and phasor algebra, Analysis of AC circuits with single basic network elements. Single phase series circuits. Three phase circuits –phase sequence, star and delta connection, relation between line and phase voltage and currents in a balanced system.

**UNIT-3**

**DC Machines**:

DC Generators -Principle and operation, constructional details, types, EMF equation, DC Motor- Principle and operation, Principle and operation, types, Torque equation, Losses and Efficiencyin DC Generators and Motors, Speed control of DC Motors

**UNIT-4**

**Transformer**:

Single phase transformer-Principle and operation, construction details, Ideal transformer andpractical transformer, equivalent circuit, losses, OC and SC Test, Efficiency and Regulation, simple problems. Three phase transformer-Classification.

**UNIT-5**

**AC Machines:**

Three phase induction Motor: Generation of rotating magnetic field, Principle and operation, constructional details, types, Concept of slip, significance of torque slip

characteristic, problemson slip, rotor frequency, rotor EMF and Torque. Principle and operation of Alternator, Singlephase induction motors – Classification.

**TEXT BOOKS:**

1. Basic concepts of Electrical Engineering, PS Subramanyam, BS Publications.
2. Basic Electrical Engineering, S.N. Singh, PHI.

**REFERENCE BOOKS:**

1. Basic Electrical Engineering, Abhijit Chakrabarthi, Sudiptanath, Chandrakumar Chanda, Tata-McGraw- Hill.
2. Principles of Electrical Engineering, V. K Mehta, Rohit Mehta, S. Chand Publications.
3. Basic Electrical Engineering, T.K. Nagasarkar and M.S. Sukhija, Oxford University Press.
4. Fundamentals of Electrical Engineering, RajendraPrasad, PHI.
5. Basic Electrical Engineering by D.P. Kothari, I.J. Nagrath, McGraw-Hill.

**Course Outcomes**

On completion of the course, students will be able to

1. Apply Kirchoff 's Laws & network reduction techniques.
2. Explain AC fundamentals of single & three phase circuits,
3. Categorize DC machines, operation and its characteristics, with the help of tests and speed control methods.
4. Acquire the knowledge of operation and performance Analysis of transformers
5. Analyze three phase induction motor operation with their characteristics & acquire the knowledge of alternators and single-phase Induction motors.

****END****

## (A30229) BASIC ELECTRICAL ENGINEERING LAB

| **B. Tech (CSE) IV Semester** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|
| | **0** | **0** | **3** | **1.5** |

**PART A:**

1. Verification of KCL and KVL.
2. Verification of Superposition theorem

3. Verification of Maximum power transfer theorem.
4. Verification of Thevenin ‘s theorem.
5. Time Response of First Order RC/RL Network for periodic, non-sinusoidal inputs- timeconstant and steady state error determination

**PART B:**

1. Magnetization characteristics of D.C. Shunt generator.
2. Speed control of DC motor.
3. Swinburne ‘s Test on DC shunt machine.
4. Brake test on DC shunt motor.
5. OC and SC tests on Single-phase transformer.
6. Brake test on 3-phase Induction motor.
7. Load Test on single phase Transformer

**Note: Any 10 of the above experiments are to be conducted.**

**Course Outcomes**

On Completion of the course, students will be able to

1. Verify KCL & KVL.
2. Verify different theorems.
3. Analyze time response of RC/RL networks.
4. Acquire the knowledge of different tests conducted on DC machines
5. Acquire the knowledge of performance of single-phase transformers and Three PhaseInduction Motors

**END**

## (A30462) ANALOG & DIGITAL ELECTRONICS LAB

| B. Tech. (CSE) IV-Semester | L | T | P | C |
|---|---|---|---|---|
| | 0 | 0 | 3 | 1.5 |

**PART A: (Only for viva voce Examination)**

**Electronic Workshop Practice** (in 3 lab sessions):

1 Identification and Specifications, testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Relays, Bread Boards. PCBs.

2 Identification and Specifications, testing of Active Devices, Diodes, BJTs,

3 Study and operation of

- Multi meters (Analog and Digital)
- Function Generator
- Dual Regulated Power Supply
- CRO.

**PART B: (For Laboratory examination - Minimum of 10 experiments)**

1. Forward & Reverse Bias Characteristics of PN Junction diode characteristics.
2. Zener diode characteristics and Zener as Voltage regulator.
3. Input & Output characteristics of Transistor in CB configurations and h-parameter calculations.
4. Input & Output characteristics of Transistor in CE configurations and h-parameter calculations
5. Half wave Rectifiers with & without filters.
6. FET Characteristics.
7. Verification of Logic gates-AND, OR, NOT, NAND, NOR, XOR& XNOR.
8. 3-8 decoder – 74LS138
9. 4 bit comparator 74LS85.
10. D Flip-Flop (74LS74) and JK Master –Slave Flip-Flop (74LS73).
11. Universal Shift registers-74LS194.
12. Decade counter IC 74LS90.

**PART C: Equipment required for Laboratories:**

1. Dual Regulated Power supply (RPS) - 0-30v
2. CROs: 0-20/30 MHz
3. Function Generators: 0-2 MHz
4. Multi meters
5. Decade Resistance Boxes
6. Ammeters (Analog or Digital): 0-20 mA, 0-200 µA
7. Voltmeter (Analog or Digital): 0-20V.

8. Electronic Components: Bread board, Resistors, Capacitors, Diodes & Transistors.

**Course Outcomes**

On Completion of the course, students will be able to

1. Examine the characteristics of different diodes and its applications.
2. Design various rectifier circuits with and without filters
3. Distinguish the characteristics of BJT, FET .
4. Verify the operation of basic Logicgate.
5. Verify simple Sequential Circuits using FlipFlops.

**END**

## (A30512) ALGORITHMS LAB

**B. Tech (CSE) IV Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**Week-1:**

1. Implement greedy algorithm for job sequencing with deadlines.

2. Implement greedy algorithm for Huffman codes.

**Week-2:**

1. Implements Prim's algorithm to generate minimum cost spanning tree.
2. Implements Kruskal's algorithm to generate minimum cost spanning tree

**Week-3:**

1. Implement Floyd's algorithm for the all pairs shortest path problem.
2. Implement Dijkstra's algorithm for the Single source shortest path problem

**Week-4:**

1. Implement Dynamic Programming algorithm for the 0/1 Knapsack problem.
2. Implement Dynamic Programming algorithm for the longest common subsequence.

**Week-5:**

1. Implement Dynamic Programming algorithm for the Optimal Binary Search Tree Problem.

**Week-6:**

**1.** Implement Dynamic Programming algorithm for the TSP Problem.

**Week-7:**

1. Implement Dynamic Programming algorithm for the matrix chain multiplication Problem.

**Week-8:**

1. Implement backtracking algorithm for the N-queens problem.

**Week-9:**

1. Implement the backtracking algorithm for the sum of subsets problem.

**Week-10:**

1. Implement the backtracking algorithm for the Hamiltonian Circuits problem.

**Week-11:**

1. Implement LC-Branch and Bound algorithm for the TSP Problem.

**Week-12:**

1. Implement LC-Branch and Bound algorithm for the knapsack Problem.

**Reference Books:**

1. Fundamentals of Algorithms – E. Horowitz et al.
2. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L

3. Rivest and Clifford Stein, MIT Press/McGraw-Hill.
4. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
5. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition,
6. Michael T. Goodrich and Roberto Tamassia, Wiley.

**Course Outcomes**

**On completion of the course students will be able to**

1. Implement Greedy Algorithm for a given problem and verify the implementation by executing the program in C.
2. Implement Dynamic Programming Algorithm design paradigm for a given problem and test the implementation by executing the program in C.
3. Demonstrate the usage of backtracking technique for solving N-Queen's problem through the implementation in C.
4. Implement & Test backtracking algorithm for solving Hamiltonian Cycle detection problem in C
5. Test Branch & Bound technique for solving Knapsack problem by implementing and executing in C

****END****

## (A30016) GENDER SENSITIZATION

**B. Tech (CSE) 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**
**Students shall 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.

****END****

## (A30514) COMPUTER NETWORKS

**B. Tech (CSE) V Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**UNIT -I**

**Introduction:** Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet.

**Physical Layer**: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless transmission.

**UNIT –II**

**Data link layer:**Design issues, framing, Error detection and correction.

**Elementary data link protocols**: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel.

**Sliding Window protocol**s: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.

**Medium Access sub layer:**The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

**UNIT –III**

**Network Layer:**Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.

**UNIT –IV**

**Transport Layer**: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

**UNIT -V**

**Application Layer**–Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

**Text Books:**

1. Computer Networks, Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI

**Reference Books:**

1. An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition,

Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. 3rd Edition, TMH.

**Course Outcomes**

The student shall be able

1. Describe the functions of each layer in OSI and TCP/IP model and explain the types of transmission media with real time applications
2. Describe the functions of data link layer and explain the protocols
3. Classify the routing protocols and analyze how to assign the IP addresses for the given network
4. Describe the Transport layer services.
5. Explain the functions of Application layer Protocols

****END****

## (A30516) OPERATING SYSTEMS

**B. Tech (CSE) V Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**UNIT-I**

Operating System Introduction, Structures - Simple Batch, Multi-programmed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls.

**UNIT –II**

**Process and CPU Scheduling**- Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, and Interposes Communication, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling.
System call interface for process management-fork, exit, wait, waitpid, exec

**UNIT –III**

**Deadlocks** - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

**Process Management and Synchronization**- The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors. Inter process Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

**UNIT –IV**

**Memory Management and Virtual Memory**- Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

**UNIT -V**

**File System Interface and Operations**-Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. usage of open, create, read, write, close, lseek, stat, ioctl, system calls

**Text Books:**

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne7th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R. Stevens, Pearson education.

**Reference Books:**

1. Operating Systems – Internals and Design Principles, Stallings, 5th Edition, Pearson Education/PHI,2005.
2. Operating System A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum 2nd edition, Pearson/PHI.
4. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education
5. Unix Internals the New Frontiers, U. Vahalia, Pearson Education.

**Course Outcomes**

Students shall be able to

1.Describe the components of computer and their respective roles in computing.
2.Explain process concepts and CPU Scheduling Algorithms
3.Demonstrate the Mutual exclusion, deadlock detection and Inter Process Communications.
4.Analyze various memory management and allocation methods.
5.Discuss File System Interface and Operations.

****END****

## (A30518) FORMAL LANGUAGES & AUTOMATA THEORY

**B. Tech (CSE) V Semester**

| L | T | P | C |
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**UNIT -I**

**Introduction to Finite Automata:** Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems.
**Nondeterministic Finite Automata:** Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions.
**Deterministic Finite Automata**: Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with Є-transitions to NFA without Є-transitions. Conversion of NFA to DFA, Moore and Melay machines

**UNIT –II**
**Regular Expressions:** Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions.
**Pumping Lemma for Regular Languages**, Statement of the pumping lemma, Applications of the Pumping Lemma.
**Closure Properties of Regular Languages:** Closure properties of Regular languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

**UNIT –III**
**Context-Free Grammars:** Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Sentential Forms, Parse Tress, Applications of Context-Free Grammars, Ambiguity in Grammars and Languages.
**Push Down Automata:** Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Acceptance by final state, Acceptance by empty stack, Deterministic Pushdown Automata. From CFG to PDA, From PDA to CFG.

**UNIT –IV**
**Normal Forms for Context- Free Grammars:** Eliminating useless symbols, Eliminating Є-Productions.Chomsky Normal form, Griebech Normal form.
**Pumping Lemma for Context-Free Languages:** Statement of pumping lemma, Applications.

**Closure Properties of Context-Free Languages:** Closure properties of CFL's, Decision Properties of CFL's.
**Turing Machines:** Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine.

**UNIT -V**
**Types of Turing machine:** Turing machines and halting machines
**Undecidability:** Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem that is RE, Undecidable Problems about Turing Machines, Recursive languages, Properties of recursive languages, Post's Correspondence Problem, Modified Post Correspondence problem, Other Undecidable Problems, Counter machines.

**Text Books:**
1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E.Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science – Automata languages and computation, Mishra And Chandrashekaran, 2nd Edition, PHI.

**Reference Books:**
1. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
2. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
3. A Text book on Automata Theory, P. K. Srimani, Nasir S. F. B, Cambridge University Press.
4. Introduction to the Theory of Computation, Michael Sipser, 3rd edition, CengageLearning.
5. Introduction to Formal languages Automata Theory and Computation, Kamala Krithivasan, Rama R, Pearson.

**Course Outcomes**

The student shall be able to:
1. Explain the concept of abstract machines and their power to recognize the languages.

2. Employ finite state machines for modeling and solving computing problems.
3. Design context free grammars for formal languages.
4. Distinguish between decidability and undecidability.
5. Gain proficiency with mathematical tools and formal methods

***END****

## (A30528) DATA WAREHOUSING AND DATA MINING

(PROFESSIONAL ELECTIVE-I)

**B. Tech (CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**UNIT -I**

**Data Warehousing**: Introduction to Data warehouse, differences between operational Database Systems and warehouses, Data Warehouse Architecture and its components , Data Warehouse Characteristics, ETL, Multi-Dimensional data model, Schema Design-Star-Snowflake-Galaxy Schema, Fact Table, Types of fact tables, Dimension Table characteristics, OLAP Cube and Operations, OLAP Server Architecture-ROLAP,MOLAP,HOLAP.

**UNIT –II**

**Introduction to Data Mining**: Introduction, what is data mining, Definition, KDD process, issues in Data Mining, Data mining Tasks.
**Data Preprocessing:** Cleaning, Missing Data, Dimensionality Reduction, Feature Subset Selection, Data transformation, Discretization, Concepts Hierarchy Generation, Measures of Similarity and Dissimilarity-Basics

**UNIT –III**

**Association Rule Mining**: Problem Definition, Frequent Item Set Generation, The Apriori principle, Support and Confidence measure, Association Rules Generation: Apriori Algorithm, FP-Growth Algorithms, Compact Representation of Frequent Item Set (Maximal and Closed Frequent Item sets).

**UNIT –IV**

**Classification**: Problem definition, General approaches to solve Classification problems, Evaluation of a Classifier, Classification techniques, Decision Tree - Decision tree construction, Methods for Expressing attribute test condition, Measures for selecting the Best Split, Algorithm for Decision tree Induction, Naive Bayes Classifiers, Bayesian Belief Networks, K -Nearest neighbor classification algorithm & characteristics.

**UNIT –V**

Cluster Analysis: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, K-Means Clustering, K-Means additional Issues, PAM Algorithm, Hierarchical Clustering Agglomerative methods and divisive methods, Basic Agglomerative Hierarchical clustering algorithms, Specific techniques, Key issues in Hierarchical Clustering, Strengths and Weakness, Outlier Detection

**Text Books:**

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber Harcourt India.
2. Introduction to Data Mining –Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson Education

**Reference Books:**

1. Data Mining Techniques – Arun K Pujari, University Press.
2. Data Warehousing in the Real World – Sam Anahory& Dennis Murray. Pearson Edn Asia.
3. Data Warehousing Fundamentals – PaulrajPonnaiah Wiley Student Edition

**Course Outcomes**

1. Explain why the data warehouse in addition to database systems.
2. Perform the pre-processing of data and apply mining techniques on it.
3. Identify the association rules, classification and clusters in large data sets.
4. Solve real world problems in business and scientific information using data mining.
5.Compare and Contrast various Clustering Algorithms.

****END****

## (A30529) SOFTWARE TESTING METHODOLOGIES

**(PROFESSIONAL ELECTIVE-I)**

**B. Tech (CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**UNIT-I**

**Introduction:** Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs.
**Flow graphs and Path testing:** - Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

**UNIT–II**
**Transaction Flow Testing:** -transaction flows, transaction flow testing techniques.
**Data flow testing**: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

**UNIT–III**
**Domain Testing:** -domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing.
**Paths, Path products and Regular expressions: -** path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

**UNIT-IV**
**Logic Based Testing**: - overview, decision tables, path expressions.
**State, State Graphs and Transition testing:** - state graphs, good & bad state graphs, state testing, Testability tips.

**UNIT–V**
**Graph Matrices and Application:** -Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools.
(Student should be given an exposure to a tool like JMeter or Win-runner).

**TEXT BOOKS:**
1. Software Testing techniques – Boris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.

**REFERENCE BOOKS:**
1. The craft of software testing - Brian Marick, Pearson Education.

2. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications
3. Software Testing, N. Chauhan, Oxford University Press.

**Course Outcomes**

Students shall be able to

1.Apply the process of testing and various methodologies in testing for developed software.
2.Write test cases for given software to test it before delivery to the customer.
3.Explain and perform Domain Testing.
4.Explain and perform path Testing.
5.Describe Graph based Testing

****END****

## (A30527) INFORMATION SECURITY (PROFESSIONAL ELECTIVE-I)

**B. Tech (CSE) V Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**UNIT -I**

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security.

Classical Encryption Techniques, DES, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operation, Blowfish, Placement of Encryption Function, Traffic Confidentiality, key Distribution, Random Number Generation.

**UNIT –II**

Public key Cryptography Principles, RSA algorithm, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography.

Message authentication and Hash Functions, Authentication Requirements and Functions, Message Authentication, Hash Functions and MACs Hash and MAC Algorithms SHA-512, HMAC.

**UNIT –III**

Digital Signatures, Authentication Protocols, Digital signature Standard, Authentication Applications, Kerberos, X.509 Directory Authentication Service. Email Security: Pretty Good Privacy (PGP) and S/MIME.

**UNIT –IV**

**IP Security:**

Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

**Web Security**: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

**UNIT -V**

Intruders, Viruses and Worms Intruders, Viruses and related threats Firewalls: Firewall Design Principles, Trusted Systems, Intrusion Detection Systems

**Text Books:**

1. Cryptography and Network Security (principles and approaches), William Stallings, 4th Edition, Pearson Education.

**Reference Books:**

1. Network Security Essentials (Applications and Standards), William Stallings Pearson Education.
2. Principles of Information Security, Whitman, Thomson.

**Course Outcomes**

**Students shall be able to**

1.Demonstrate the knowledge of cryptography, network security concepts and applications.
2. Apply security principles in system design.
3. Identify and investigate vulnerabilities and security threats and mechanisms to counter them.
4.Describe IP, WEB security mechanisms.
5.Explain Intrusion Detection Systems

****END****

**(A30530) ARTIFICIAL INTELLIGENCE**
**(Professional Elective-I)**

**B. Tech (CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**UNIT -I**

**Problem Solving by Search-I:**

Introduction to AI, Intelligent Agents

**Problem Solving by Search –II:**

Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search, Informed (Heuristic) Search Strategies: Greedy best-first search, A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces, Searching with Non-Deterministic Actions, Searching with Partial Observations, Online Search Agents and Unknown Environment .

**UNIT –II**

**Problem Solving by Search-II and Propositional Logic**

**Adversarial Search:**

Games, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-Time Decisions.

**Constraint Satisfaction Problems:**

Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems.

**Propositional Logic:**

Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic

**UNIT –III**

**Logic and Knowledge Representation**

**First-Order Logic**:

Representation, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.

**Inference in First-Order Logic:**
Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.
**Knowledge Representation:**
Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.

**UNIT –IV**

**Planning**
**Classical Planning:**
Definition of Classical Planning, Algorithms for Planning with State-Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches.
**Planning and Acting in the Real World:**
Time, Schedules, and Resources, Hierarchical Planning, Planning and Acting in Nondeterministic Domains, Multi agent Planning

**UNIT –V**

**Uncertain knowledge and Learning**
**Uncertainty:**
Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use.
**Probabilistic Reasoning:**
Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First-Order Probability, Other Approaches to Uncertain Reasoning; Dempster-Shafer theory.

**Learning:**
Forms of Learning, Supervised Learning, Learning Decision Trees. Knowledge in Learning: Logical Formulation of Learning, Knowledge in Learning, Explanation-Based Learning, Learning Using Relevance Information, Inductive Logic Programming

**TEXT BOOKS:**
1. Artificial Intelligence A Modern Approach, Stuart Russell and Peter Norvig, 3rd Edition, Pearson Education

**REFERENCE BOOKS:**

1. Artificial Intelligence, E. Rich and K. Knight, , 3rd Edition, TMH
2. Artificial Intelligence, Patrick Henny Winston, 3rd Edition, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert systems – Patterson, Pearson Education.

**Course Outcomes**

Students shall be able to

1. Formulate an efficient problem space for a problem expressed in natural language.
2. Apply AI techniques to solve problems of game playing, and logic inference.
3. Deduce first order inference and represent knowledge using appropriate technique
4. Describe various palnning and acting for the real-world problems in single agent and multi -agent systems.
5. Explain the concept of uncertainty and probabilistic reasoning.

****END****

## (A30515) COMPUTER NETWORKS LAB

**B. Tech (CSE) V Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**List of Experiments**

1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC, CCIP
3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijsktra's algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.

6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption.
8. Write a program for congestion control using Leaky bucket algorithm.
9. Write a program for frame sorting technique used in buffers.
10. Wireshark
    - i. Packet Capture Using Wire shark
    - ii. Starting Wire shark
    - iii. Viewing Captured Traffic
    - iv. Analysis and Statistics & Filters.
11. How to run Nmap scan
12. Operating System Detection using Nmap
13. Do the following using NS2 Simulator
    - i. NS2 Simulator-Introduction
    - ii. Simulate to Find the Number of Packets Dropped
    - iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
    - iv. Simulate to Find the Number of Packets Dropped due to Congestion
    - v. Simulate to Compare Data Rate& Throughput.
    - vi. Simulate to Plot Congestion for Different Source/Destination
    - vii. Simulate to Determine the Performance with respect to Transmission of Packets

**Course Outcomes**

Students shall be able to

1. Implement framing methods in data link layer.
2. Implement Error Correction and Detection mechanisms
3. Implement the routing algorithms in simple networks
4. Simulate the working of LAN
5. Analyze Network Traffic using simulators

****END****

## (A30517) OPERATING SYSTEMS LAB

| B. Tech (CSE) V Semester | L | T | P | C |
|---|---|---|---|---|
| | 0 | 0 | 3 | 1.5 |

### List of Experiments

**Week 1:** Simulate the following CPU Scheduling Algorithms
a). FCFS b). SJF c). Priority d). Round Robin
**Week 2:** Simulate Banker's Algorithm for Deadlock Avoidance.
**Week 3:** Simulate Memory Management Technique.
a) Paging b) Segmentation
**Week 4:** Simulate the following Page Replacement Algorithms
a). FIFO b). LRU c). OPTIMAL
**Week 5:** Simulate the following File Allocation Strategies
a). Sequential b). Indexed c. Linked
**Week 6:** Simulate the following disk scheduling algorithms
a). SCAN b). CSCAN c). SSTF
**Week 7**: Write a C program to simulate the following contiguous memory allocation techniques
a). First-fit b) Best-fit c) Worst-fit
**Week 8:** Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir)
**Week 9:**
a) Write a C program to simulate producer-consumer problem using semaphores.
b) Write a C program to simulate the concept of Dining-Philosophers problem
**Week 10**: Write C programs to illustrate the following IPC mechanisms
a) Pipes b) FIFOs c) Message Queues d) SharedMemory

**Course outcomes**
**Students shall be able to**

1. Implement CPU Scheduling Algorithms
2. implement deadlock avoidence algorithms
3. implement various memory management algorithms
4. implement various file management techniques
5. Demonstrate Inter-process communication

****END****

## (A30526) MOBILE APPLICATION DEVELOPMENT LAB

**B. Tech (CSE) V Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 1 | 2 | 2 |

**Note:** *All the Experiments of Mobile Application Development Lab are developed using Android Studio*

1.(a) Create an Android application that shows Hello + name of the user and run it on an emulator.
(b)Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button.

2. Create a screen that has input boxes for User Name, Password, Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button.
Use (a) Linear Layout (b)Relative Layout and (c) Grid Layout or Table Layout.

3. Develop an application that shows names as a list and on selecting a name it should show the details of the candidate on the next screen with a "Back" button. If the screen is rotated to landscape mode (width greater than height), then the screen should show list on left fragment and details on right fragment instead of second screen with back button. Use Fragment transactions and Rotation event listener.

4. Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.

5. Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of the notification.

6. Create an application that uses a text file to store user names and passwords (tab separated fields and one record per line). When the user submits a login name and password through a screen, the details should be verified with the text file data and if they match, show a dialog saying that login is successful. Otherwise, show the dialog with Login Failed message.

7. Create a user registration application that stores the user details in a database table.

8. Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user.

9. Create an admin application for the user table, which shows all records as a list and the admin can select any record for edit or modify. The results should be reflected in the table.

10. Develop an application that shows all contacts of the phone along with details like name, phone number, mobile number etc.

11. Create an application that saves user information like name, age, gender etc. in shared preference and retrieves them when the program restarts.

12. Create an alarm that rings every Sunday at 8:00 AM. Modify it to use a time picker to set alarm time.

13. Create an application that shows the given URL (from a text field) in a browser.

**Text Books**

1.Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012.
2.Android Application Development for Java Programmers, James C Sheusi, Cengage Learning,2013 References.

**Reference Books**

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013

**Course Outcomes**

Students shall be able to

1. Implement simple Android Hello world application
2. Create forms with various Layouts
3. Create menu driven applications
4. Design & Implement real World mobile applications in Android Environment
5. Implement database application using sqlite database.

****END****

## (A30014) ENVIRONMENTAL SCIENCES

**B. Tech. (CSE) V-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 – Insitu 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, Equitableuse of resources for sustainable life styles, Environmental Impact Assessment.

**Text Books**

1. Environmental Science - Y. Anjaneyulu, B S Publications.
2. Environmental studies-Deekshadave, 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, students shall be able to

1. Acquire the knowledge on environment
2. Acquire the knowledge of various Natural Resources
3. Develop skills in understanding of various environmental problems
4. Develop skills to protect the Environment
5. To understand various environmental issues in India

**END**

## (A30519) COMPILER DESIGN

**B. Tech (CSE) VI Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**UNIT -I**

**Introduction:** The structure of a compiler, the science of building a compiler, programming language basics.
**Lexical Analysis:** The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

**UNIT –II**

**Syntax Analysis:** Introduction, Context-Free Grammars, writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars and Parser Generators.

**UNIT –III**

**Syntax-Directed Translation:** Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's.
**Intermediate-Code Generation:** Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Switch-Statements, Intermediate Code for Procedures.

**UNIT –IV**

**Run-Time Environments:** Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.
**Code Generation:** Issues in the Design of a Code Generator, The Target Language, addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

**UNIT –V**

**Machine-Independent Optimization:** The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

**Text Books:**

1. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, 2nd Edition, Pearson.

**Reference Books:**

1. lex&yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Compiler Construction, Kenneth C. Louden, Thomson. Course Technology.

**Course Outcomes**

Students shall be able to

1. Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.
2. Acquire skills in using lex tool &yacc tool for devleoping a scanner and parser.
3. Design and implement LL and LR parsers
4. Design algorithms to do code optimization in order to improve the performance of a program in terms of space and time complexity.
5. Design algorithms to generate machine code.

****END****

## (A30520) COMPILER DESIGN LAB

**B. Tech (CSE) VI Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

### LIST OF EXPERIMENTS

1.Write a C/C++ -- program to Implement Lexical Analyzer.
2.Write a Program to Implement the Lexical Analyzer Using LEX Tool.
3.Write a Program to Compute FIRST of Non-Terminals.
4.Write a Program to compute FOLLOW of Non-Terminals.
5.Write a Program to implement Top Down Parsing for a given Grammar.
6. Write a Program to implement LL (1) parser for a given Grammar.
7.Write a Program to implement the LALR grammar for a given Grammar.
8.Write a Program to Convert Infix Expression to Post Expression.
9.Write a Program to Construct the Predictive Parser for a Given Grammar.
10.Write a Program to Construct the Shift-Reduce Parser for a given Grammar.
11.Write a Program to Construct the LALR Parser for a Given Grammar.
12.Generate the Three Address Code for a Given Expression
13.Generate the Optimized Three Address Code for a Given Expression.

**Course Outcomes**

The students shall be able to:

1. Design appliction to demonstatre the working deterministic finite automata
2. Develop applications using LEX tool
3. Apply predictive parsing algorithms to generate parse Trees .
4. Create YACC programs to parse Strings
5. Develop applications to convert a Source code to machine Code

****END****

## (A30521) SCRIPTING LANGUAGES

**B. Tech (CSE) VI Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**UNIT -I**

**Introduction**: Ruby, Rails, The structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and webservices

**RubyTk** – Simple Tk Application, widgets, Binding events, Canvas, scrolling

**UNIT –II**

**Extending Ruby:** Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter

**UNIT –III**

**Introduction to PERL and Scripting**

Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines

**UNIT –IV**

**Advanced perl**

Finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

**UNIT –V**

TCL
TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and up level commands, Name spaces, trapping

errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming,
Security Issues, C Interface.

**Tk**
Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

**Text Books:**
1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pragmatic Programmers guide by Dabve Thomas Second edition

**Reference Books:**
1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J. Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J.P. Flynt, Cengage Learning.

**Course Outcomes**
Students shall be able to
1. Differentiate a program & script, and expalin python basics
2. Write applications using python datastructures and functions
3. Explain OOPs in python and Build User defined modules
4. Develop programs using fundamentals of perl
5. Design applications using advanced perl

****END****

## (A30522) SCRIPTING LANGUAGES LAB

**B. Tech (CSE) VI Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

Prerequisites: Any High-level programming language (C, C++)

### List of Experiments

1. Write a Ruby script to create a new string which is n copies of a given string where n is a nonnegative integer
2. Write a Ruby script which accept the radius of a circle from the user and compute the parameter and area.
3. Write a Ruby script which accept the user's first and last name and print them in reverse order with a space between them
4. Write a Ruby script to accept a filename from the user print the extension of that
5. Write a Ruby script to find the greatest of three numbers
6. Write a Ruby script to print odd numbers from 10 to 1
7. Write a Ruby script to check two integers and return true if one of them is 20 otherwise return their sum
8. Write a Ruby script to check two temperatures and return true if one is less than 0 and the other is greater than 100
9. Write a Ruby script to print the elements of a given array
10. Write a Ruby program to retrieve the total marks where subject name and marks of a student stored in a hash
11. Write a TCL script to find the factorial of a number
12. Write a TCL script that multiplies the numbers from 1 to 10
13. Write a TCL script for Sorting a list using a comparison function
14. Write a TCL script to
(i)create a list (ii) append elements to the list (iii)Traverse the list
(iv)Concatenate the list
15. Write a TCL script to comparing the file modified times.
16. Write a TCL script to Copy a file and translate to native format.
17. a) Write a Perl script to find the largest number among three numbers.
b) Write a Perl script to print the multiplication tables from 1-10 using

subroutines.

18. Write a Perl program to implement the following list of manipulating functions
a) Shift b) Unshift c) Push
19.
a) Write a Perl script to substitute a word, with another word in a string.
b) Write a Perl script to validate IP address and email address.

20. Write a Perl script to print the file in reverse order using command line arguments

**Text Books**

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pragmatic Programmers guide by Dabve Thomas Second edition

**References**

1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J. Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, LarryWall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J.P. Flynt, Cengage Learning.

**Course outcomes**

**Students shall be able to**

1. Develop applications using PERL language primitives
2. Create Perl scripts to perform File I/O
3. Develop application using Python Programming Language primitives
4. Design python application to connect and retrieve data from RDBMS
5. Write a python script to create a file and perform file I/O

****END****

## (A30523) WEB TECHNOLOGIES

**B. Tech (CSE) VI Semester**

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 2 |

**UNIT -I**

**Introduction to PHP:** Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, reading data from web form controls like text boxes, radio buttons, lists etc.,

Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies.

**File Handling in PHP:** File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

**UNIT –II**

**HTML Common tags**- List, Tables, images, forms, Frames; Cascading Style sheets;

**XML:** Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

**UNIT –III**

**Introduction to Servlets:** Common Gateway Interface (CGt), Life cycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC.

**UNIT –IV**

**Introduction to JSP:** The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP.

**UNIT –V**

**Client-side Scripting:** Introduction to Javascript, Javascript language – declaring variables, scope of variables, functions. event handlers (onclick, onsubmit etc.), Document Object Model, Form validation.

**Text Books:**

1. Web Technologies, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill

**Reference Books:**

1. Web Programming, building internet applications, Chris Bates, 2nd Edition, Wiley Dreamtech
2. Java Server Pages, Hans Bergsten, SPD O'Reilly,
3. Java Script, D. Flanagan, 6th Edition, O'Reilly Media.
4. Beginning Web Programming-Jon Duckett WROX.
5. Programming world wide web, R.W. Sebesta, 4th Edition, Pearson.
6. Internet and World Wide Web — How to program, Dietel and Nieto, Pearson.

**Course Outcomes**

Students shall be able to

1. write client-side scripting ,perform validation of forms using AJAX
2. write server-side scripting with PHP language
3. Describe XML parse and use XML Data with Java
4. Create Server-side programming with Java Servlets and JSP
5. Develop Client-side Scripting with Java script and form validation

****END****

## (A30524) WEB TECHNOLOGIES LAB

**B. Tech (CSE) VI Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

1. Write a PHP script to print prime numbers between 1-50.
2. PHP script to
    a. Find the length of a string.
    b. Count no of words in a string.
    c. Reverse a string.
    d. Search for a specific string.
3. Write a PHP script to merge two arrays and sort them as numbers, in descending order.
4. Write a PHP script that reads data from one file and write into another file.
5. Develop static pages (using Only HTML) of an online book store. The pages should resemble: **www.amazon.com**. The website should consist the following pages.
    a. Home page
    b. Registration and user Login
    c. User Profile Page
    d. Books catalog
    e. Shopping Cart
    f. Payment By credit card
    g. Order Conformation

6. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.

7.Create and save an XML document on the server, which contains 10 user's information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.

8. Install TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.

9. Redo the previous task using JSP by converting the static web pages of assignments 2 into dynamic web pages. Create a database with user information and books information. The books catalogue shouldbe dynamically loaded from the database. Follow the MVC architecture while doing the website.

**Text Books**

1. WEB TECHNOLOGIES: A Computer Science Perspective, Jeffrey C. Jackson, Pearson Education

**References**

1. Deitel H.M. and Deitel P.J., "Internet and World Wide Web How to program", Pearson International, 2012, 4th Edition.
2. J2EE: The complete Reference by James Keogh, McGraw-Hill
3. Bai and Ekedhi, The Web Warrior Guide to Web Programming, Thomson
4. Web technologies, Black Book, Dreamtech press.
5. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India

**Course Outcomes**

Students shall be able to:

1. Develop static web pages using Hyper Text Markup Language
2. Create extensible markup language documents to store and transport data in a specific format
3. Create reusable software components using Java Beans
4. Develop dynamic web pages using Java server Pages
5. Create and deploy websites in webservers.

****END****

## (A30531) PYTHON PROGRAMMING
**(OPEN ELECTIVE)**

**B. Tech (CSE)**

| 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, 2nd edition

**Course Outcomes**

Students shall 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.

****END****

## (A30532) SOFTWARE PROJECT MANAGEMENT

**(PROFESSIONAL ELECTIVE-II)**

**B. Tech (CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**UNIT-I**

**Conventional Software Management**: The waterfall model, conventional software Management performance.

**Evolution of Software Economics:** Software Economics, pragmatic software cost estimation.

**Improving Software Economics:** Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

**UNIT–II**

**Life cycle phases:** Engineering and production stages, inception, Elaboration, construction, transition phases.

**Artifacts of the process:** The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

**Model based software architectures:** A Management perspective and technical perspective.

**Work Flows of the process:** Software process workflows, Iteration workflows

**UNIT–III**

**Checkpoints of the process:** Major mile stones, Minor Milestones, Periodic status assessments.

**Iterative Process Planning**: work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

**UNIT-IV**

**Project Organizations and Responsibilities**: Line-of-Business Organizations, Project Organizations, evolution of Organizations.

**Process Automation:** Automation Building blocks, The Project Environment.

**UNIT–V**

**Project Control and Process instrumentation:** The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

Tailoring the Process: Process discriminates.

**Future Software Project Management:** modern Project Profiles, Next generation Software economics, modern process transitions.

**Case Study:** The command Center Processing and Display system- Replacement (CCPDSR).

**Text Books:**

1. Software Project Management, Walker Royce: Pearson Education, 2005.

**Reference Books:**

1. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-Hill Edition.
2. Software Project Management, Joel Henry, Pearson Education.
3. Software Project Management in practice, Pankaj Jalote, Pearson Education.2005

**Course Outcomes**

Students shall be able to

1. Describe software economics, phases in the life cycle of software development, project organization, project control and process instrumentation.
2. Analyze the major and minor milestones, artifacts and metrics from management and technical perspective.
3. Design and develop software products using conventional and modern principles of software project management.
4. Describe Project Organization and Process Automation
5. Explain project control and Process instrumentation.

****END****

## (A30533) MOBILE COMPUTING
**(PROFESSIONAL ELECTIVE-II)**

**B. Tech (CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**UNIT-I**

Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS

**UNIT–II**

**(Wireless) Medium Access Control (MAC)**

Motivation for a specialized MAC (Hidden and exposed terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/ (IEEE 802.11)

**Mobile Network Layer**

IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP

**UNIT–III**

**Mobile Transport Layer**

Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

**Database Issues**

Database Hoarding & Caching Techniques, Client-Server Computing & adaptation, Transactional Models.

**UNIT-IV**

**Data Dissemination and Synchronization**

Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods

**UNIT–V**

**Mobile Ad hoc Networks (MANETs)**

Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, Mobile Agents, Service Discovery.

**Text Books:**

1. Mobile Communications, Jochen Schiller, Addison-Wesley, 2nd Edition, 2009.
2. Mobile Computing, Raj Kamal, Oxford University Press, 2007, ISBN: 0195686772

**Reference Books:**

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition,
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley,
3.Principles of Mobile Computing, 2/e, Hansmann, Merk, Nicklous, Stober, Springer, 2003.

**Course Outcomes**

Students shall be able to

1. Describe mobile system architecture
2. Explain wireless MAC layer protocols
3. Describe the functionalities of mobile transport layer
4. Explain wireless synchronization mechanisms.
5. Illustrate Routing algorithms

****END****

## (A30003) ADVANCED ENGLISH COMMUNICATION SKILLS LAB

**B. Tech (CSE)**

| L | T | P | C |
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**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.

**UNIT-I:**

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

**UNIT-II:**

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

**UNIT-III:**

**Group Discussion**: Dynamics of group discussion, intervention, summarizing, modulation of voice, body languagea, relevance, fluency and coherence.

**UNIT-IV:**

**Interview Skills**: Concept and process, pre-interview planning, opening strategies, answering strategies, Interview through tale and video- conferencing.

**UNIT-V:**

**Resume` and Technical Report Writing:** Structure and presentation, planning, defining the career objective, projecting one's 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.

**COURSE OUTCOMES**

**Students shall be able to:**

1. Explain the rules of formal and informal situational dialogues and develop verbal & non-verbal communication skills.

2. Build academic vocabulary, use a variety of accurate sentence structures and utilize digital literacy tools to develop writing and grammar skills.
3. Express thoughts with clarity and hold discussions with everyone to develop analytical thinking.
4. Develop the skills required for attending different types of interviews.
5. Illustrate the report writing and summarize the main ideas of report; apply key elements of structure and style in drafting loner documents and read an increasing range of text.

****END****

## (A30558) DATA VISUALIZATION
**(PROFESSIONAL ELECTIVE-II)**

**B. Tech (CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Unit-I**

**Introduction:** What Is Visualization? History of Visualization, Relationship between Visualization and Other Fields, The Visualization Process, The Role of Cognition, Pseudocode Conventions, The Scatterplot.

**Data Foundations:** Types of Data, Structure within and between Records, Data Preprocessing

**Visualization Foundations:** The Visualization Process in Detail, Semiology of Graphical Symbols, The Eight Visual Variables, Taxonomies

**Unit-II**

**Visualization Techniques for Spatial Data**: One-Dimensional Data, Two-Dimensional Data, Three-Dimensional Data, Dynamic Data, Combining Techniques

**Visualization Techniques for Geospatial Data:** Visualizing Spatial Data, Visualization of Point Data, Visualization of Line Data, Visualization of Area Data

**Unit-III**

**Visualization Techniques for Time-Oriented Data:** Introduction, Definitions: Characterizing Time-Oriented Data, Visualizing Time-Oriented Data

**Visualization Techniques for Multivariate Data:** Point-Based Techniques, Line-Based Techniques, Region-Based Techniques, Combinations of Techniques

**Unit-IV**

**Visualization Techniques for Trees, Graphs, and Networks:** Displaying Hierarchical Structures, Displaying Arbitrary Graphs/Networks.

**Text and Document Visualization**: Introduction, Levels of Text Representations, The Vector Space Model, Single Document Visualizations, Document Collection Visualizations, Extended Text Visualizations.

**Unit-V**

**Designing Effective Visualizations:** Steps in Designing Visualizations, Problems in Designing Effective Visualizations,

**Visualization Systems:** Systems Based on Data Type, Systems Based on Analysis Type, Text Analysis and Visualization, Modern Integrated Visualization Systems, Toolkits, Libraries.

**TEXT BOOK:**

1.Ward, Grinstein Keim, Interactive Data Visualization: Foundations, Techniques, and Applications. Natick: A K Peters, Ltd. CRC Press

**REFERENCE BOOKS:**

1. E. Tufte, The Visual Display of Quantitative Information, Graphics Press

**Course Outcomes:**

After completion of the course student shall be able to

1. Explain the basic and advanced techniques of information visualization and scientific visualization.
2. Explain key techniques of the visualization process.
3. Describe a detailed view of visual perception, the visualized data and the actual visualization,interaction and distorting techniques
4. Desgin visualizations for hierarchical strutures.
5. Design effective visualizations

**END**

## (A30534) DESIGN PATTERNS
**(PROFESSIONAL ELECTIVE-III)**

**B. Tech (CSE)**

| L | T | P | C |
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| 3 | 0 | 0 | 3 |

**UNIT-I**

**Introduction**: What is a design pattern? design patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

**UNIT–II**

**Designing a Document Editor**: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary.

**UNIT–III**

**Creational Patterns**: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

**UNIT-IV**

**Structural Pattern**: Adapter, Bridge, Composite, Decorator, Facade, Flyweight, Proxy.

**UNIT–V**

**Behavioral Patterns**: Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template Method, Visitor.

**TEXT BOOKS:**

1. Design Patterns, Erich Gamma, Pearson Education

**REFERENCES:**

1. Pattern's in Java, Vol –I, Mark Grand, Wiley DreamTech.
2. Pattern's in Java, Vol-II, Mark Grand, Wiley DreamTech.

3. Java Enterprise Design Patterns Vol-III, Mark Grand, Wiley DreamTech.
4. Head First Design Patterns, Eric Freeman, O'reily publications

**COURSE OUTCOMES:**

Student shall be to

1. Explain Object-Oriented concepts for creating truly OOP programs
2. Use creational design patterns in software design for class instantiation
3. Describe structural design patterns for better class and object composition
4. Use behavioral patterns for better organization and communication between the objects
5. Use refactoring to compose the methods for proper code packaging

****END****

## (A30535) MACHINE LEARNING
**(PROFESSIONAL ELECTIVE-III)**

| | L | T | P | C |
|---|---|---|---|---|
| **B. Tech (CSE)** | **3** | **0** | **0** | **3** |

**UNIT -I**

**Introduction** - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias.

**Decision Tree Learning** – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

**UNIT –II**

**Artificial Neural Networks-1**– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.

**Artificial Neural Networks-2**- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

**Evaluation Hypotheses** – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

**UNIT –III**

**Bayesian learning** – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length

principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.

**Computational learning theory** – Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.

**Instance-Based Learning**- Introduction, k-nearest neighbor algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

**UNIT –IV**

**Genetic Algorithms**– Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

**Learning Sets of Rules**– Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

**Reinforcement Learning** – Introduction, the learning task, Q–learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming

**UNIT –V**

**Analytical Learning-1**- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

**Analytical Learning-2**-Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

**Combining Inductive and Analytical Learning**– Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis.

**TEXT BOOKS:**

1. Tom M. Mitchell, Machine Learning, Mc Graw Hill,1997.

**REFERENCE BOOKS:**

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis

**Course Outcomes**

The student shall be able to

1.Apply Decision Tree Learning.
2.Represent neural networks and explain the properties of neural networks
3.Apply machine learning techniques to address the real time problems in differentAreas.
4.Describe Neural Networks and its usage in machine learning application.
5.Explain Genetic Algorithms, Genetic Programming, Reinforcement Learning techniques.

****END****

## (A30536) ADHOC & SENSOR NETWORKS

**(PROFESSIONAL ELECTIVE-III)**

**B. Tech (CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**UNIT-I**

**Introduction to Ad Hoc Networks** - Characteristics of MANETs, Applications of MANETs and Challenges of MANETs. Routing in MANETs - Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms-Proactive: DSDV; Reactive: DSR, AODV; Hybrid: ZRP; Position-based routing algorithms-Location Services-DREAM, Quorum-based; Forwarding Strategies: Greedy Packet, Restricted Directional Flooding-DREAM, LAR.

**UNIT–II**

**Data Transmission** - Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability based Methods, Area-based Methods, Neighbor Knowledge-based: SBA, Multipoint Relaying, AHBP.
**Multicasting**: Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP; Hybrid: AMRoute, MCEDAR.

**UNIT–III**

**Geocasting:** Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR.TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

**UNIT-IV**

**Basics of Wireless, Sensors and Lower Layer Issues**
Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

**UNIT–V**

**Upper Layer Issues of WSN**
Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots

**TEXT BOOKS:**

1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P. Aggarwal, World Scientific Publications, March 2006.

**REFERENCE BOOKS:**

1. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science.
2.Wirelss Communications & Networks 2/e, William Stallings, PEA , 2007.
3.Handbook of Wireless Networks and Mobile Computing, Ivan Stojmenovic, Wiley, 2007.

**Course Outcomes:**

Students shall be able to
1. Appraise the importance of Adhoc networks such as MANET
2. Explain the design considerations for deploying the wireless network infrastructure.
3. Describe the state-of-the-art research in the emerging subject of Ad Hoc and Wireless Sensor Networks
4.Solve the issues in real-time application development based on ASN.
5.Conduct further research in the domain of ASN

****END****

## (A30537) DATA ANALYTICS WITH R
**(PROFESSIONAL ELECTIVE-IV)**

**B. Tech (CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**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‖, Edition 2015,Dreamtech Press,

**Course Outcomes**

The student shall be able

1. Explain Data Science concepts.
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.

****END****

## (A30538) DEEP LEARNING
**(PROFESSIONAL ELECTIVE-IV)**

**B. Tech (CSE)**

| 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, 1999

**Reference Books:**

1. Neural Networks and Learning Machines. Haykin, Prentice Hall of India, 2010
2. Pattern Recognition and Machine Learning, C.M. Bishop, Springer, 2006

**Course Outcomes**

The students shall 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.

****END****

## (A30539) ETHICAL HACKING
**(PROFESSIONAL ELECTIVE-IV)**

**B. Tech (CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**UNIT-I**

Introduction to Ethical Hacking, Fundamentals of Computer Networking, TCP/IP protocol stack, IP addressing and routing, TCP and UDP, IP Subnets, Routing protocols, IP Version 6. IP Spoofing port scanning, DNS Spoofing. Dos attacks – SYN attacks, Smurf attacks, UDP flooding, DDOS – Models. Firewalls – Packet filter firewalls, Packet Inspection firewalls – Application Proxy Firewalls. Batch file Programming.

**UNIT–II**

Hacking windows, Network hacking, Web hacking- Password hacking. A study on various attacks – Input validation attacks, Buffer overflow attacks, Privacy attacks, Vulnerability assessment: OpenVAS, Nessus, etc. Social Engineering attacks, Malware threats, penetration testing by creating backdoors.

**UNIT–III**

Introduction to cryptography, private-key encryption, public-key encryption, cryptographic hash functions, digital signature and certificate, applications. Fundamentals of Computer Fraud – Threat concepts – Framework for predicting inside attacks – Managing the threat – Strategic Planning Process

**UNIT-IV**

Steganography, biometric authentication, network-based attacks, DNS and Email security, Sniffing: Wireshark, ARP Poisoning, DNS Poisoning, Hacking Wireless networks, Denial of Service attacks, Architecture strategies for computer fraud prevention – Protection of Web sites – Intrusion detection system – NIDS, HIDS – Penetrating testing process**.**

**UNIT–V**

Elements of Hardware security: Side-Channel attacks, Physical inclinable functions, hardware Trojans, Hacking web applications: vulnerability assessment, SQL Injection, Cross-Site Scripting Penetration Testing Steps, Pen- Test LegalFramework, Automated Penetration Testing Tools, Pen -Test Deliverables

**Text Books:**

1.Kenneth C. Brancik ―Insider Computer Fraud‖ Auerbach Publications Taylor & Francis Group–2008.
2.Ankit Fadia ―Ethical Hacking‖ second edition Macmillan India Ltd, 2006
3.Data and Computer Communications -- W. Stallings.

**Reference Books:**

1.Hacking Exposed Web 2.0, by Rich Annings, Himanshu Dwivedi, Zane Lackey, Tata Mc Graw hill Edition
2.Ethical Hacking & Network Defense, Michael T. Simpson edition
3.Hacking Exposed Windows, Joel Scambray, cissp, Stuart Mcclure, Cissp, Third Edition, Tata McGraw hill edition
4.Hacking Exposed Window server 2003, Joel Scambray Stuart Mcclure, Tata Mc Graw hill Edition

**Course Outcomes**

Students shall be able to
1.Describe various types DoS attacks.
2.Explain Network, Web, Password Hacking
3.Describe cryptography techniques.
4.Explain Email-security, Sniffing, SQL injection
5.Perform Penetration Test.

****END****

## (A30540) BIG DATA ANALYTICS
**(PROFESSIONAL ELECTIVE-V)**

**B. Tech (CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Unit-I**
**Introduction to Big Data:**
Introduction- Big Data, Characteristics & Importance of Big Data – Four V's, Relational Database Vs Big Data, Big Data Analytics, Big Data Applications, Introduction to NoSQL Database Systems

**Unit- II**
**Hadoop:**
Introduction to Hadoop, History and future of Hadoop **HDFS-** HDFS Architecture and How to load data into HDFS, Rack Awareness, Data node to name node communication, fault- tolerance feature of HDFS, Read data from HDFS, Block Size concept of HDFS,

**Unit – III**
**Map Reduce:**
Introduction to Map Reduce and its Architecture, Hadoop Eco System, Setup Hadoop on a Single node, Simple Map Reduce Program, Executing Map Phase – Shuffling and Sorting, Reducing Phase Execution

**Unit- IV**
**PIG:**
Introduction to Apache PIG, Data Model and Schema, Load Store and Relational Operators, Processing Data Using Apache PIG, Parameter Substitution, user defined functions

**Unit - V**
**HIVE:**

Introduction to HIVE & its Architecture, HIVE Data Types and Table Creation, loading data in HIVE Tables, Managed Tables and External Tables, Querying HIVE Tables, Introduction to R

**Text Books:**

1. Big Data, Black Book: Covers Hadoop 2, MapReduce, Hive, YARN, Pig, R and Data Visualization, DT Editorial Services, DreamTech
2. Programming Pig by Alan Gates, O′Reilly; 2nd Revised edition
3. Programming Hive by Edward Capriolo, Dean Wampler, Jason Rutherglen, O′Reilly; First edition

**Reference Books:**

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
2. Chris Eaton, Drikderoos et al., "Understanding Big Data", McGraw Hill,2012
3. Tom White, "HADOOP: The definitive Guide", O Reilly 2012
4. Vignesh Prajapati, "Big Data Analytics with R and Hadoop", Oracle Press, 2014

**Outcomes:**

Students shall be able to
1.Describe the Big-Data and Big Data Analytics
2.Illustrate the Hadoop Software Frame work and Its Core components (HDFS and Map-Reduce).
3.Demonstrate loading and reading Data from HDFS and Processing using Map-Reduce.
4.Implement Pig Latin Scripts for processing Data.
5.Use Hive Query language for creating and querying tables

****END****

## (A30541) COMPUTER VISION & IMAGE PROCESSING
**(PROFESSIONAL ELECTIVE-V)**

**B. Tech (CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**UNIT-I**

**Introduction:** Image Formation and Coordinate Transformations, Camera Matrix, Motion/Stereo Pin-hole model, Human eye cognitive aspects of colour and 3D space; illumination; Sampling and Quantization, Coordinate transformations and camera parameter, 3D transformations problem, Introduction to OpenCV : Image Data Structure, Coding format

**UNIT–II**

**Image Processing & Motion Estimation:** Image Processing - Noise Removal, Blurring, Edge Detection: Canny, Gaussian, Gabor, Texture Edges, Curvature, Corner Detection. Motion Estimation: Horn-Schunk Optical Flow Formulation, Euler-Lagrange formulation: Calculus of variations theory. Structure Recovery from Motion [Kanade]

**UNIT–III**

**Segmentation:** Concept of Figure vs. Ground, Watershed, Change Detection, Background Subtraction, Texture Segmentation Gaussian Mixture Models - Applications in Color/Motion based Image Segmentation, Background Modeling and Shape Clustering

**UNIT-IV**

**Machine Learning techniques in Vision & Object Tracking:** Bayesian Classification, Maximum Likelihood Methods, Neural Networks; Non-parametric models; Manifold estimation, Support Vector Machines; Temporal sequence

learning **Object Tracking:** Exhaustive vs. Stochastic Search, Shapes, Contours, and Appearance Models. Mean-shift tracking; Contour-based models

**UNIT–V**

Object Modeling & Detection**:** Exhaustive vs. Stochastic Search Shapes, Contours, and Appearance Models. Mean-shift tracking; Contour-based models, Fundamental matrix / Epipolar geometry Adaboost approaches: Face Detection / Recognition Large Datasets; Attention models. Applications: Surveillance, Object detection, etc.

**Text Books:**

1. David Forsyth and Jean Ponce, Computer Vision: A modern Approach, Prentice Hall India 2004:
2. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2008

**Reference Books:**

1. E.R. Davies, Machine Vision, Theory Algorithms Practicalities, Elsevier 2005
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing, Analysis, and Machine Vision. Brooks/Cole / Thomson 1999
3. Russell and Norvig: AI: A modern Approach, Prentice Hall 2000.
4. Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Cambridge Univ Press 2000
5. Richard O. Duda, Peter E. Hart, and David G. Stork, Pattern Classification, 2nd ed., Wiley Asia, 2002.
6. Rafael C. Gonzalez and Richard E. Woods “Digital Image Processing”, Pearson
7. Rafael C. Gonzalez, Richard E. Woods and Steven L. Eddins “Digital Image Processing Using MATLAB”, McGraw Hill Education

**Course Outcomes**

**Students shall be able to**

1.Explain Sampling, Quantization, techniques
2.Describe Edge detection techniques
3.Apply Machine learning techniques for object tracking
4.Perform Object Modelling
5.Explain Contour based models

****END****

## (A30542) CLOUD COMPUTING
**(PROFESSIONAL ELECTIVE-V)**

**B. Tech (CSE)**

| 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 Distributed System Modeling, Clustering and Virtualization
2. Discuss basic concepts of cloud computing.
3. Distinguish Infrastructure as a Service(IAAS) & Platform and Software as a Service(PAAS/SAAS).
4. Design & implement cloud computing applications.
5. Explore some important cloud computing driven commercial systems.

****END****

## (A30543) NATURAL LANGUAGE PROCESSING
**(PROFESSIONAL ELECTIVE-VI)**

**B. Tech (CSE)**

| L | T | P | C |
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**UNIT -I**

**Finding the Structure of Words**: Words and Their Components, Issues and Challenges, Morphological Models.

**Finding the Structure of Documents**: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches.

**UNIT –II**

**Syntax Analysis**: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

**UNIT –III**

**Semantic Parsing:** Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

**UNIT –IV**

Predicate-Argument Structure, Meaning Representation Systems, Software.

**UNIT –V**

**Discourse Processing:** Cohension, Reference Resolution, Discourse Cohension and Structure Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems,
Multilingual and Cross lingual Language Modeling

**Text Books:**

1. Multilingual natural Language Processing Applications: From Theory to Practice, Daniel M. Bikel and ImedZitouni, Pearson Publication
2. Natural Language Processing and Information Retrieval, Tanvier Siddiqui, U.S. Tiwary

**Reference Books:**

1. Speech and Natural Language Processing, Daniel Jurafsky& James H Martin, Pearson Publications

**Course Outcomes**

The student shall be able to

1.Infer knowledge about model and functional Units of Artificial Neural Networks
2. Illustrate different types of Feedforward Networks
3. Apply different Deep Neural Networks in real world problems
4. Apply different Convolutional Neural Networks in real world problems
5. Illustrate different types of Recurrent Neural Networks

****END****

## (A30544) INTERNET OF THINGS
**(PROFESSIONAL ELECTIVE-VI)**

**B. Tech (CSE)**

| L | T | P | C |
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**UNIT-I**
Introduction to IoT Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs. IoT & M2M Machine to Machine, Difference between IoT and M2M, Software define Network

**UNIT–II**
Network & Communication aspects Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination

**UNIT–III**
Challenges in IoT Design challenges, Development challenges, Security challenges, Other challenges

**UNIT-IV**
Domain specific applications of IoT Home automation, Industry applications, Surveillance applications, Other IoT applications

**UNIT–V**
Developing IoTs Introduction to Python, Introduction to different IoT tools, developing applications through IoT tools, developing sensor-based application through embedded system platform, Implementing IoT concepts with python

**Text Books:**
1. Vijay Madisetti, ArshdeepBahga, Ïnternet of Things, “A Hands-on Approach”, University Press
2. WaltenegusDargie, ChristianPoellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice, Wiley-Blackwell;

**Reference Books:**

1.Dr. SRN Reddy, RachitThukral and Manasi Mishra, “Introduction to Internet of Things: Apractical Approach”, ETI Labs
2.Pethuru Raj and Anupama C. Raman, “The Internet of Things: Enabling Technologies, Platforms, and Use Cases”, CRC Press
3. Jeeva Jose, “Internet of Things”, Khanna Publishing House, Delhi
4. Adrian McEwen, “Designing the Internet of Things”, Wiley
5. Raj Kamal, “Internet of Things: Architecture and Design”, McGraw Hill
6. Cuno Pfister, “Getting Started with the Internet of Things”, O Reilly Media

**Course Outcomes**

**Students shall be able to**

1. Describe internet of Things and its hardware and software components
2. Interface I/O devices, sensors & communication modules
3. Remotely monitor data and control devices
4. Develop real life IoT based projects
5. Develop application using IoT tools with python

****END****

## (A30545) BLOCK CHAIN TECHNOLOGIES

## (PROFESSIONAL ELECTIVE-VI)

**B. Tech (CSE)**

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**UNIT-I**

Introduction: Overview of Block chain, Public Ledgers, Bitcoin, Smart Contracts, Block in a Block chain, Transactions, Distributed Consensus, Public vs Private Block chain, Understanding Crypto currency to Block chain, Permissioned Model of Block chain, Overview of Security aspects of Block chain Basic Crypto Primitives: Cryptographic Hash Function, Properties of a hash function, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography, A basic cryptocurrency.

**UNIT–II**

Bitcoin and Block chain: Creation of coins, Payments and double spending, Transaction in Bitcoin Network, Block Mining. Working with Consensus in Bitcoin: Distributed consensus in open environments, Consensus in a Bitcoin network, Proof of Work (PoW) – basic introduction, HashcashPoW, Bitcoin PoW, Proof of Stake, Proof of Burn and Proof of Elapsed Time, The life of a Bitcoin Miner, Mining Difficulty, Mining Pool.

**UNIT–III**

Enterprise application of Block chain: Cross border payments, Know Your Customer (KYC), Food Security, Block chain enabled Trade, We Trade – Trade Finance Network, Supply Chain Financing, and Identity on Block chain.

**UNIT-IV**

Attacking the Blockchain with a Framework Approach:

Technical Challenges, Market/Business Challenges, Legal /Regulatory Barriers and Behavioral/Educational Challenges, Blockchain in Financial Services: Blockchain Applications in Financial Services, Strategic Questions for Financial Services

**UNIT–V**

Hyperledger Fabric- Architecture, Identities and Policies, Membership and Access Control, Transaction Validation**,** Bitcoin Security, Limitations and How to Overcome Blockchains, Reinventing the Blockchain, The Ten Rules to Never Break on the Blockchain

**TEXT BOOKS:**

1. Melanie Swan, "Block Chain: Blueprint for a New Economy", O'Reilly, 2015
2. Josh Thompsons, "Block Chain: The Block Chain for Beginners- Guide to Block chain Technology and Leveraging Block Chain Programming"
3. Daniel Drescher, "Block Chain Basics", Apress; 1stedition, 2017
4. Anshul Kaushik, "Block Chain and Crypto Currencies", Khanna Publishing House, Delhi.

**REFERENCE BOOKS:**

1. Blockchain for Dummies by Manav Gupta, John Wiley & Sons publication
2. Mastering Bitcoin Unlocking Digital Crypto currencies‖, by Andreas M. Antonopoulos, O 'Reilly Publication, 1st Edition.
3. Ritesh Modi, "Solidity Programming Essentials: A Beginner's Guide to Build Smart Contracts for Ethereum and Block Chain", Packt Publishing
4. Imran Bashir, "Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Packt Publishing
5. Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna, "Hands-On Block Chain with Hyperledger: Building Decentralized Applications with Hyperledger Fabric and Composer", Import, 2018

**Course Outcomes**

At the end of this course, the students will be able to:

1. Describe Block chain Technology

2. Explain Block chain with Crypto currency
3. Build and deploy block chain applications
4. List the obstacles, challenges of Blockchain
5. Analyze hashing applications in real time scenarios

****END****

## (A30554) JAVA PROGRAMMING
## (OPEN ELECTIVE)

**B. Tech (CSE)**

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**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 (2e), Oxford publications.

**Reference Books:**

1.Herbert Schildt, Java: The Complete Reference (9e), McGraw Hill Education;
2. C. Thomas Wu, An introduction to object-oriented programming with Java (5e), McGraw-Hill Education;

**Course Outcomes**

The student shall 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

****END****

## (A30555) INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS (OPEN ELECTIVE)

**B. Tech (CSE)**

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**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 (6e), Pearson publisher
2. RamezElmasri, Shamkant B. Navathe, Fundamentals of Database Systems, Pearson publisher

**Course Outcomes**

**Students shall 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.

****END****

## (A30556) CYBER SECURITY
## (Common to all branches-Mandatory Course)

**B. Tech (CSE) VI Sem**

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**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 BOOK:**

1.Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics 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**

Students shall be able to

1. Explain cyber-crimes and how they are planned
2. Describe vulnerabilities of mobile and wireless devices
3. Illustrate the crimes in mobile and wireless devices
4. Be able to use cyber security, information assurance, and cyber/computer forensics software/tools.
5. Identify various crimes.

**END**

## (A30013) BUSINESS MANAGEMENT & FINANCIAL ANALYSIS

**B. Tech (CSE) VII Semester**

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**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:**

Students shall be able to

1. Float different forms of business enterprises and generate capital from various sources.
2. Analyze financial stability of an enterprise in view of cut-throat competition from rivals.
3. Tune Enterprise in accordance with changes in surround economic environment.
4. Forecast demand, production, cost, capital, price under different market situations for various products of business enterprise in general.
5. Employ various functions of management in different functional areas of enterprise.

**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:**

1. Kotler Philip & Keller Kevin Lane: Marketing Mangement 12/e, PHI, 2005
2. Koontz &Weihrich: Essentials of Management, 6/e, TMH, 2005 Thomas N. Duening& John M. Ivancevich Management—Principles and Guidelines, Biztantra, 2003.
3. Ambrish Gupta (2004), Financial Accounting for Management, Pearson Education, New Delhi, India.
4. Domnick Salvatore (2011), Managerial Economics in a Global Economy, 7th edition, Oxford University Press, United States of America.
5. Narayanaswamy (2005), Financial Accounting, A Managerial Perspective, Prentice Hall of India private Ltd, New Delhi, India.
6. Aryasri (2005), Managerial Economics and Financial Analysis, 2nd edition, Tata McGraw Hill, New Delhi, India

****END****

## (A30471) PRINCIPLES OF ELECTRONIC COMMUNICATIONS (OPEN ELECTIVE)

**B. Tech (CSE)**

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**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, 20th reprint, 2004.
2. Principles of Communication Systems – H Taub& D. Schilling, GautamSahe, TMH, 3rd Edition, 2007.
3. Communication Systems – B.P. Lathi, BS Publication, 2004.

**References:**

1. Analog and Digital Communication – K. Sam Shanmugam, Willey, 2005.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
3. Digital Communications- John G. Proakis, MasoudSalehi- 5th Edition, Mcgarw- Hill,2008.

**Course Outcomes**

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

1. Explain 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.

**END**

## (A30472) BASIC ELECTRONICS ENGINEERING
## (OPEN ELECTIVE)

**B. Tech (CSE)**

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**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, transistorConstruction, BJTOperation, 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 $\beta$, 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, 2 Ed., 1998, TMH.
2. Electronic Devices & Circuits- Mohammad Rashid, Cengage Learning, 2013
3. Electronic Devices & Circuits- David A. Bell, 5 Ed, Oxford

**REFERENCE BOOKS:**

1. Integrated Electronics- J. Millman and Christos C. Halkais, 1991 Ed., 2008, TMH.
2. Electronic Devices and Circuits- R.L. Boylstad and Louis Nashelsky, 9 Ed., 2006, PEI/PHI
3. Electronic Devices and Circuits- B. P. Singh, Rekha Singh, Pearson, 2 Ed, 2013.
4. Electronic Devices and Circuits- K. Lal Kishore, 2 Ed., 2005, BSP.
5. Electronic Devices and Circuits- Anil K. Maini, Varsha Agarwal, 1 Ed., 2009, Wiley India Pvt Ltd.
6. Electronic Devices and Circuits- S. Salivahanan, N. Suresh Kumar, A. Vallavaraj, 2 ed., 2008, TMH.

**Course outcomes:**

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

1. Classify different types of diodes and its characteristics.
2. Explain various rectifiers and filters.
3. Analyze the characteristics of BJT & FET.
4. Design the DC bias circuitry of BJT and explain its stability
5. Distinguish and explain the characteristics of various FET Amplifiers

**END**

## (A30383) FUNDAMENTALS OF ENGINEERING MATERIALS (OPEN ELECTIVE)

**B. Tech (CSE)**

| L | T | P | C |
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**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.

**END**

## (A30377) BASICS OF THERMODYNAMICS
## (OPEN ELECTIVE)

**B. Tech (CSE)**

| L | T | P | C |
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| 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.

**END**

## (A30258) BASICS OF POWER ELECTRONICS & DRIVES (OPEN ELECTIVE)

| | L | T | P | C |
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| **B. Tech (CSE)** | **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, 2nd ed., 2007.
2. P.S. Bimbhra, "Power Electronics", Khanna Publishers, New Delhi, 2012..
3. Muhammad H. Rashid, "Power Electronics - Circuits, Devices and Applications", Prentice Hall of India, 3rd ed., 2003.

**Reference Books:**

1. VedamSubramanyam, "Power Electronics – Devices, Converters and Applications", New Age International Publishers Pvt. Ltd., Bangalore, 2nd ed. 2006.
2. Ned Mohan, Undeland and Robbins, "Power Electronics – Converters, Applications and Design", John Willey & sons, Inc., 3rd ed., 2003.
3. V.R.Moorthi, "Power Electronics", Oxford University press, 2005.
4. G..K. Dubey, S.R. Doradla, A. Joshi, and R.M.K. Sinha, "Thyristorised Power Controllers", New Age International Ltd. Publishers, 1986 (Reprint 2008).
5. P.T. Krein, "Elements of Power Electronics", Oxford University Press, 1998.
6. G..K. Dubey, " Fundamentals of Electrical Drives", Narosa Publishing House, New Delhi, 2nd ed. 2001

**Course Outcome:**

After learning the course, the students should 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. Analyze various three phase converters
4. Compare the various types of dc-to-dc converters.
5. Apply the knowledge of power electronic converter for various applications.

**END**

## (A30252) POWER GENERATION SYSTEMS
## (OPEN ELECTIVE)

**B. Tech (CSE)**

| L | T | P | C |
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### 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 Cogenerationsystems.

### 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 BOOK:**

1. Nag. P.K., "Power Plant Engineering", Third Edition, Tata McGraw – Hill Publishing Company Ltd., 2008.
2. Non-Conventional Energy Sources /G.D. Rai
3. Renewable Energy Technologies /Ramesh & Kumar /Narosa

**REFERENCE BOOKS:**

1. El-Wakil. M.M., "Power Plant Technology", Tata McGraw – Hill Publishing Company Ltd.,2010.
2. Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in association with the Open University, 2004.
3. Thomas C. Elliott, Kao Chen and Robert C. Swanekamp, "Power Plant Engineering", Second Edition, Standard Handbook of McGraw – Hill, 1998
4. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
5. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
6. Solar Energy /Sukhame

**Course Outcomes:**

After learning the course, the students should 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

****END****

## (A30160) DISASTER MANAGEMENT AND MITIGATION
## (OPEN ELECTIVE)

**B. Tech (CSE)**

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**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 indeced hazards & Disasters - Natural Hazards - Planetary Hazards / Disasters - Extra Planetary Hazards / disasters - Planetary Hazards - Endongenous 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 - Heal 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 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)

1. Emergency Stage
2. 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 2014.
3. Disaster Science and Management by T. Bhattacharya, McGraw Hill Education (India) Pvt Ltd Wiley 2015

**REFERENCE BOOKS:**
1. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BS Publications 2009.
2. National Disaster Management Plan, Ministry of Home affairs, Government of India (http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf)

Course outcomes
Students shall be able to

1. Understand to describe the basic typesof Environmental hazards and disasters. Understand how to react effectively to natural, manmade, and technological threats.

2. Understand how to react effectively to natural, manmade, and planetary hazards.
3. Explore the history of the field and comprehend how past events are earthquake, landslides and volcanicazards.
4. Describe the basic concepts of the emergency management cycle mitigation, preparedness, response, and recovery.
5. Recognizes the stakeholders in disaster management system, their jurisdiction and responsibilities.

****END****

## (A30161) REMOTE SENSING AND GIS
## (OPEN ELECTIVE)

| | L | T | P | C |
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| **B. Tech (CSE)** | **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 Data
Structure, 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 2008.
2. Remote Sensing and GIS B. Bhatta by Oxford Publishers 2015.
3. Introduction to Geographic Information System – Kang-Tsung Chang, McGraw-Hill-2015

**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 2004.
3. Basics of Remote sensing & GIS by S. Kumar, Laxmi Publications.

**Course Outcomes:**

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

1. Understand the basic concept of GIS and its applications; know different types of data representation in GIS.
2. Understand the principles of aerial and satellite remote sensing, Able to comprehend the energy interactions with earth surface features, spectral properties of water bodies.
3. Apply knowledge of GIS software and able to work with GIS software in various application fields.
4. Illustrate spatial and non-spatial data features in GIS and understand the map projections and coordinates systems.
5. Apply knowledge of GIS and understand the integration of Remote Sensing and GIS.

****END****

## (C30161) LOGISTICS AND SUPPLY CHAIN MANAGEMENT (OPEN ELECTIVE)

**B. Tech (CSE)**

| L | T | P | C |
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**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 servicealliances. 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

**REFERENCE BOOKS**

1. Sunil Chopra and Peter Meindl: Supply chain Management: Strategy, Planning and Operation, Third edition, Pearson, 2009.
2. Donald J. Bowersox and David J. Closs: Logistical Management: The Integrated Supply Chain Process, TMH, 2006.

3. Rajasekhar &Acharyulu: Logistics and Supply Chain Management, Excel, 2009.
4. Sridhara Bhat: Logistics and supply chain management, Himalaya, 2009.
5. John T Mentzer: Supply Chain Management, Sage Publications, 2008
6. Donal Waters: Global Logistics, Kogan Page, 2009
7. Christain schuh et al: The purchasing chess board, Springer link,2009.
8. Philip B.Schary, TageSkjott-Larsen: Managing the Global Supply Chain, Viva, 2008.

**COURSE OUTCOMES**

On completion of the course students will be able to

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

****END****

## (C30162) KNOWLEDGE MANAGEMENT
## (OPEN ELECTIVE)

**B. Tech (CSE)**

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**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 Amrit Tiwana, 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.

**REFERENCES BOOKS:**


1. Mattison: Web Warehousing & Knowledge Management, Tata McGraw-Hill,2009
2. Becerra Fernandez: Knowledge management: An Evolutionary view, PHI, 2009
3. Fernando: Knowledge Management, Pearson, 2009
4. B. Rathan Reddy: Knowledge management, Himalaya, 2009
5. Tapan K Panda: Knowledge Management, Excel, 2009.
6. Barnes: Knowledge Management systems, Cengage, 2009.
7. Tiwana: The Knowledge Management tool kit, 2/e, Pearson Education, 2009.
8. Warier: Knowledge Management, Vikas Publishing House, 2009
9. Sislop: Knowledge Management, Oxford University Press, New Delhi, 2009
10. Debowski: Knowledge Management, Wiley Student Edition, Wiley India, 2007


**Course Outcomes:**

On completion of the course students will be able to:

1. Understanding the key theories and models in 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 various knowledge management formats and technologies.
5. Implementing the ethical implications in managing knowledge.

****END****

## (A30473) IMAGE PROCESSING
## (OPEN ELECTIVE)

**B. TECH(CSE)**

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**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 high pass filter (Sharpining), 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. Woods, 3rd edition. Pearson, 2008
2. Digital Image Processing – S. Jayaraman, S Esakkirajan, T Veerakumar-TMH, 2010

**REFERENCE BOOKS:**

1. Digital Image Processing using MATLAB – Rafael C. Gonzalez, Richard E woods and Steven L. Eddings, 2nd Edition, TMH, 2010.
2. Fundamentals of Digital Image Processing – A. K. Jain, PHI, 1989.
3. Digital Image processing and Computer vision – Somka, Hlavac, Boyle Cengage learning (Indian edition) 2008.
4. Introductory Computer vision Imaging Techniques and Solutions – Adrian low, 2008, 2nd Edition.
5. Introduction to Image Processing & Analysis – John C. Russ, J. Christian Russ, CRC press, 2010.

**Course Outcomes**

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

1. Describe the fundamental concepts of digital image processing and trasformation techniques.
2. Explain the image enhancement techniques in spatial and frequency domain
3. Explain degradation technique and restoration techniques for image reconstruction.
4. Describe various image segmentation methods and morphological methods.
5. Analyze various Lossy and Lossless image compression techniques.

****END****

## (A30474) DIGITAL ELECTRONICS
## (OPEN ELECTIVE)

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**B. TECH(CSE)**

**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:**
**FUNDAMENTALS OF SEQUENTIAL MACHINES:**

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, 3rd Edition, Cambridge.
2. Digital Design -Morris Mano, PHI, 3rd Edition, 2006.

**REFERENCE BOOKS:**
1 Introduction to switching design and logic design _ Fredriac J. Hill, Gerald R. Peterson, 3rd ED, John Wiley & Sons Inc
2. Digital fundamentals – A Systems approach-Thomas L. Floyd, Pearson, 2013.
3. Digital logic design- Ye Brian and Holds Worth, Elsevier.
4. Fundamentals of Logic Design - Charles H. Roth, Thomson Publications, 5th Edition, 2004.
5. Digital Logic Applications and Design - John M. Yarbrough, Thomson Publications, 2006.
6. Digital Logic and state machine design – Comer, 3rd, oxford, 2013.

**Course Outcomes**
At the end of the course the student will be able to:
1. Identify the various numeric and binary Numbers.
2. Apply the basic theorems to simply the Boolean Functions.
3. Design simple Combinational Circuits.
4. Design simple Sequential Circuits.
5. Distinguish the Finite State Machines

**END**

## (A30357) FUNDAMENTALS OF MANUFACTURING PROCESSES (OPEN ELECTIVE)

**B. Tech (CSE)**

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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.

****END****

## (A30379) FUNDAMENTALS OF AUTOMOBILE ENGINEERING (OPEN ELECTIVE)

**B. Tech (CSE)**

| L | T | P | C |
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| 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.

****END****

## (A30259) ELECTRICAL & HYBRID VEHICLES
## (OPEN ELECTIVE)

| | L | T | P | C |
|---|---|---|---|---|
| **B. Tech (CSE)** | **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, 2013.
2. C.C. Chan and K.T. Chau, Modern Electric Vehicle Technology, OXFORD University Press, 2001.
3. Chris Mi, M. Abul Masrur, David Wenzhong Gao, Hybrid Electric Vehicles Principles and Applications with Practical Perspectives, Wiley Publication, 2011.

**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 Outcome:**

After learning the course, the students should be able to:

1. Demonstrate the working of Electric Vehicles and recent trends
2. Analyze the energy storage requirements of EV and HEV
3. Develop the electric propulsion unit and its control for application of electric vehicles
4. Make use of various parameters for the design of EV and HEV
5. Analyze different power converter topology used for electric vehicle application

****END****

## (A30260) ELECTRICAL SAFETY
## (OPEN ELECTIVE)

**B. Tech (CSE)**

| 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.

**REFERENCE BOOKS**

1." Accident prevention manual for industrial operations", N.S.C., Chicago, 1982.
2. Indian Electricity Act and Rules, Government of India.
3. Power Engineers – Handbook of TNEB, Chennai, 1989.
4. Martin Glov Electrostatic Hazards in powder handling, Research Studies Pvt. Ltd., England1988.
5. Fordham Cooper, W., "Electrical Safety Engineering" Butterworth and Company, London, 1986.

**Course Outcomes:**

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

1. Illustrate the concept and necessity of electrical safety
2. Explain the possibilities of electrical hazards and its preventive measures
3. Identify the appropriate protective system to be adopted against various electrical hazards
4. Demonstrate the selection, installation, operation of various protective equipments.
5. Compare various hazardous zone and to identify the appropriate protective equipment for those zones.

**END**

## (A30162) GREEN BUILDINGS
## (OPEN ELECTIVE)

**B. Tech (CSE)**

| 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 envelopematerial 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, 2006.
2. Sue Roaf et all: Ecohouse, A design guide; Elsevier Architectural Press, 2007.
3. Thomas E Glavinich: Green Building Construction; Wiley, 2008.
4. Brenda and Robert Vale: Green Architecture, Design for a Sustainable Future; Thamesand Hudson, 1996.

**Course Outcomes**

**Students shall be able to**

1. Explain the principles of building planning, its bylaws and provide facilities for rainwater harvesting
2. Understand the concepts of green buildings
3. Students should be able to describe the importance and necessity of green building.
4. Students should be able to assess a building on the norms available for green building.
5. Students should be able to suggest materials and technologies to improve energy efficiency of building.

**END**

## (A30163) AIR POLLUTION AND CONTROL
## (OPEN ELECTIVE)

| | L | T | P | C |
|---|---|---|---|---|
| **B. Tech (CSE)** | **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 t o 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:**

After studying this course, students will be able to:

1. Upon completion of this course, the students would have the knowledge of ambient air pollution, its sources, its effects, and mechanisms for air pollution prevention.
2. Identify the sources of air pollutants and their effect on human, plants and materials.
3. Apply knowledge of meteorology for controlling air pollution
4. Design air pollution controlling equipment.
5. Apply knowledge of legislation for prevention and control of air pollution.

**END**

## (C30163) MANAGEMENT OF INDUSTRIAL RELATIONS (OPEN ELECTIVE)

| | L | T | P | C |
|---|---|---|---|---|
| **B. Tech (CSE)** | **3** | **0** | **0** | **3** |

**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.

**Journals:** Indian Journal of Industrial Relation; NHRD Journal of Career Management; Management and Labour Studies; Personnel today; Leadership excellence; Indian Journal of Training & Development.

**References:**


- Mamoria, Mamoria, Gankar "Dynamics of Industrial Relations" Himalaya Publishing House.2012.
- Dr K S Anandram "Cases in Personnel Management Industrial Relations and Trade Relations" Everest, 2012.
- Arun Monappa, Ranjeet Nambudiri, Selvaraj "Industrial Relations and Labour Laws", TMH,2012.
- A.M. Sharma "Industrial Relations and Labour Laws", Himalaya Publishing House,2013.
- Ratna Sen "Industrial Relations-Text and cases "Macmillan Publishers,2011.
- Kubendran.V, Kodeeswari.K "Industrial Relations and Labour Laws "Himalaya Publishing House,2011.
- Punekar S.D, Deodhar S.B, SaraswathiSankaren" LabourWelfare, Trade Unionism and Industrial Relations, "Himalaya Publishing House,2012.
- B.D. Singh "Industrial Relations" Excel Books 2008.
- S C Srivastava "Industrial Relations and Labor Laws" Vikas, 2012.
- Padhi"Labour and Industrial Relations" PHI, 2012.
- Venkata Ratnam "Industrial Relations" Oxford, 2012.


**COURSE OUTCOMES**

On completion of the course students will be able to:

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.

****END****

## (C30164) ENTREPRENEURSHIP
## (OPEN ELECTIVE)

**B. Tech (CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**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.

**Journal:**

- **The Journal of Entrepreneurship,** Entrepreneurship Development Institute of India, Ahmedabad
- **Journal of Human Values**: IIM Calcutta.

**References:**


1. D F Kuratko and T V Rao "Entrepreneurship- A South-Asian Perspective "Cengage Learning, 2012. **(For PPT, Case Solutions Faculty may visit: login.cengage.com)**
2. Vasant Desai "Small Scale industries and entrepreneurship" Himalaya publishing 2012.
3. Rajeev Roy "Entrepreneurship" 2e, Oxford, 2012.
4. B. Janakiram and M. Rizwana" Entrepreneurship Development: Text & Cases, Excel Books,2011.
5. Stuart Read, Effectual Entrepreneurship, Routledge, 2013.
6. Robert Hisrich et al "Entrepreneurship" 6th e, TMH, 2012.
7. Nandan H, Fundamentals of Entrepreneurship, PHI, 2013
8. Shejwalkar, Entrepreneurship Development, Everest, 2011
9. Khanka, Entrepreneurship Development, S. Chand, 2012


**COURSE OUTCOMES:**

On completion of the course students will be able to:

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.

****END****

## (A30475) DATA COMMUNICATIONS
## (OPEN ELECTIVE)

| | L | T | P | C |
|---|---|---|---|---|
| **B. Tech (CSE)** | **3** | **0** | **0** | **3** |

**Unit I:**
Introduction to data communications, networking, signals, noise, modulation and demodulation. Data communication network architecture, layered network architecture, open systems interconnection, data communications circuits, serial and parallel data transmission, data communications circuit arrangements, data communication networks, alternate protocol suites. Information capacity, bits, bit rate, baud, and M-ARY encoding.

**Unit II:**
Metallic cable transmission media & optical fiber transmission media: metallic transmission lines, transverse electromagnetic waves, characteristics of electromagnetic waves, transmission line classifications, metallic transmission line types, metallic transmission line equivalent circuit, wave propagation on metallic transmission lines, metallic transmission line losses, block diagram of an optical fiber communications system, optical fiber versus metallic cable facilities.

**Unit III**:
Digital transmission & multiplexing and t-carriers digital transmission: pulse modulation, pulse code modulation, dynamic range, signal–to-quantization noise voltage Ratio, linear versus nonlinear PCM codes
Multiplexing: Time- division multiplexing, t1 digital carrier system, north American digital multiplexing hierarchy, digital line encoding, t carrier systems, European digital carrier system, statistical time – division multiplexing, frame synchronization, frequency- division multiplexing, wavelength- division multiplexing, synchronous optical network

**Unit IV:**

Telephone instruments and signals: The subscriber loop, standard telephone set, basic telephone call procedures, call progress tones and signals, cordless telephones, caller id, electronic telephones, paging systems.

The telephone circuit: The local subscriber loop, telephone message- channel noise and noise weighting, units of powers measurement, transmission parameters and private-line circuits, voice-frequency circuit arrangements, crosstalk.

**Unit V:**

Data communication codes, bar codes, error control, error detection, error correction, data formats, data communications hardware, character synchronization.

**TEXT BOOKS:**

1. Introduction to Data Communications and Networking, Wayne Tomasi, Pearson Education.

**REFERENCE BOOKS:**

1. Data Communications and Networking, Behrouz A Forouzan, Fourth Edition.Tmh.
2. Computer Communications and Networking Technologies, Gallow, Secondedition Thomson
3. Computer Networking and Internet, Fred Halsll, Lingana Gouda Kulkarni, Fifth Edition, Pearson Education

**Course Outcomes:**

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

1. Explain the basic concepts of data communication systems.
2. Distinguish various types of transmission medias for data communications.
3. Compare different multiplexing techniques for digital transmission
4. Aanalyze different telephone instruments, signal and circuits
5. Identify different error detecting and correcting codes

****END****

## (A30476) MICROCONTROLLERS & APPLICATIONS (OPEN ELECTIVE)

**B. Tech (CSE)**

| L | T | P | C |
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| 3 | 0 | 0 | 3 |

**UNIT-I**

**Introduction to Microprocessors and Microcontrollers**: Introduction to Microprocessor and Micro Controller, Number system and Binary arithmetic. Microprocessor Architecture (8085 and 8086) and Microcomputer System, memory map and addressing, memory classification, review of logic device for Interfacing, Memory Interfacing, Overview of 8086 Instruction Set, stacks and Interrupts.

**UNIT-II**

**The 8051 Architecture:** 8051 Microcontroller hardware, Program Counter and Data Pointer, A and B CPU registers, Flags and Program Status Word (PSW),Internal Memory : Internal RAM – Stack and Stack Pointer, Special Function Registers, Internal ROM, Input / Output Pins, ports and Circuits, External Memory, Timers and Counters, Serial data Input/ Output, interrupts.

**UNIT-III**

**8051 Instruction set:** Assembly Language Programming Process, Addressing Modes, Assembler Directives, Data Transfer, Arithmetic, Logical and Branch Instructions, Decimal Arithmetic, Interrupt Programming, Serial Data Communication.

**8051 Programming: Basic Assembly Language Programming,** Input/ Output Port Programming, 8051 Timer / Counter Programming, 8051 Serial Communication Programming, 8051 Interrupt Programming.

**UNIT-IV**

**8051 Applications:** Introduction, Interfacing Keyboards, Key pads, Interfacing Displays (Seven Segment Displays and LCD's), Interfacing A/D Convertors,

Interfacing D/A Convertors, Interfacing Hardware Circuits for Multiple Interrupts, 8051 Interfacing with 8255, Interfacing Eternal Memory with 8051.

**UNIT-V**

**Introduction to Advanced Architectures:** ARM and SHARC, Processor and memory organization and Instruction level parallelism; Networked embedded

System: Bus protocols, I2 bus and Can bus; Internet-Enabled Systems, Design Example-elevator Controller.

**TEXT BOOKS:**

1. K.J. Ayala "The 8051 Micro controller, Architecture, Programming 8- Applications "Thomson Delmar Learning
2. RS Gaonkar, "Microprocessors Architecture, Programming and Applications "Penram International.
3. M. A. Mazidi& J.G Mazidi." The 8051 Micro controller 8- Embedded System "Pearson Education.

**REFERENCE BOOKS:**

1. B. Ram "Fundamentals of Microprocessors and Microcomputers "DhanpatRai and Sons.
2. 'Computers as Components- Principles of Embedded Computing System Design', Wayne Wolf, Elsevier (2nd Edition)
3. Advanced µp & peripherals- A.K. Raj & KM Bhardhadi, TMF 2nd Edition

**Course Outcomes:**

**Students shall be able to**

1. Explain the architecture of 8085 and 8086 microprocessors and 8051 microcontroller.
2. Distinguish various addressing modes, assembler directives and assembly level instructions of 8051 micro controller.
3. Develop assembly language programs for interfacing various I/O devices and memories with 8051 micro controller.
4. Apply the knowledge of interfacing various I/O devices and memories with 8051 micro controller.
5. Compare architectures of various advanced processors

****END****

## (A30382) FUNDAMENTALS OF MECHANICAL ENGINEERING (OPEN ELECTIVE)

| | L | T | P | C |
|---|---|---|---|---|
| **B. Tech (CSE)** | **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.

****END****

## (A30378) WASTE TO ENERGY
## (OPEN ELECTIVE)

**B. Tech (CSE)**

| 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.

****END****

## (A30253) FUEL CELL TECHNOLOGY
## (OPEN ELECTIVE)

**B. Tech (CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**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.

**REFERENCEBOOKS:**

1. Fuel Cells for automotive applications – professional engineering publishing UK. ISBN 1- 86058 4233, 2004.

2. Fuel Cell Technology Handbook SAE International GregorHoogers CRC Press ISBN 0-8493-0877-1-2003.

**Course Outcome:**

After learning the course, the students should 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

****END****

## (A30255) ENERGY EFFICIENCY IN ELECTRICAL UTILITIES (OPEN ELECTIVE)

**B. Tech (CSE)**

| L | T | P | C |
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### 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 systems compo nents; 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 assessment of Refrigeration plan ts -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. Fifth Ed. The Fairmount Press, 2006.
2. Thumann, Younger. Handbook of Energy Audit. Sixth Ed. The Fairmount Press, 2003.
3. Thumann, Mehta. Handbook of Energy Engineering. Fifth Ed. The Fairm ount Press, 2001

**REFERENCES BOOKS**

1. General Aspect of Energy Management and Energy Audit, 2010, BEE Guide book
2. Energy Efficiency in Thermal Utilities, 2010, BEE guide book
3. Energy Efficiency in Electrical Utilities, 2010, BEE guide book
4. Turner WC. Energy Management Handbook, 5th Edition, The Fairmont Press, 2005

**Course Outcome:**

After learning the course, the students should be able to:

1. Explain the energy efficient technologies meant for electrical systems
2. Examine the energy conservation opportunities in compressed air and HVAC systems
3. Assess the performance of refrigeration plants
4. Choose the appropriate energy efficient method for fanning, pumping, cooling, compressed air and refrigeration systems.
5. Analyze various efficient lighting systems and their energy conservation measures

**END**

## (A30164) BASICS OF CIVIL ENGINEERING
## (OPEN ELECTIVE)

| | L | T | P | C |
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| **B. Tech (CSE)** | **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, Vol. I to IV, 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**

1. learn the brief introduction of all area covered under the head of civil engineering.
2. understand the need of monitoring land, air , water pollution and take remedial measures to control them.
3. understand Basic Concepts of Ecology and Ecosystem.
4. Understand the need to plan, develop and maintain infrastructure at a high level.
5. Understand the importance of Risk Management for the successful completion Infrastructure Projects

****END****

## (A30165) SUSTAINABILITY CONCEPTS IN CIVIL ENGINEERING (OPEN ELECTIVE)

**B. Tech (CSE)**

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**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:**

After studying this course, students will be able to:

1. Learn about the principles, indicators and general concept of sustainability.
2. Apprehend the local, regional and global impacts of unsustainable designs, products and processes.
3. Student shall be able to apply the sustainability concepts in engineering
4. Know built environment frame work sand their use
5. Understand how building and design is judged and valued by clients and stakeholders and how to implement sustainability.

****END****

## (C30165) BASICS OF INSURANCE & TAXATION
## (OPEN ELECTIVE)

**B. Tech (CSE)**

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**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

**REFERENCE BOOKS:**


1. Mishra M.N: Insurance Principles and Practice; S.Chand and Co. New Delhi.
2. Principles of Life Insurance: Dr.Shrikrishan Laxman Karve, Himalaya
3. Insurance: Theory & Practice: Tripathy& Pal, PHI
4. Taxation: H.Prem raja - Sri Hamsrala publications
5. Direct Taxes &Practice :Dr. V K Singhania, Taxman Publications.
6. Gour and Narang - Income Tax Law and Practice, Kalyani Publication
7. Practicals in Taxation: H.Prem raja - Sri Hamsrala publications.
8. Income Tax: B.B. Lal, Pearson Education
9. Taxation: R.G. Saha, Himalaya Publishing House Pvt. Ltd
10. Income Tax: Johar, McGraw Hill Education
11. Taxation Law and Practice: Balachandran &Thothadri, PHI Learning.


**COURSE OUTCOMES:**

On completion of the course students will be able to:

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 assesments, computation of individual Incomes

****END****

## (C30166) BUSINESS ETHICS & CORPORATE GOVERNANCE (OPEN ELECTIVE)

**B. Tech (CSE)**

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**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.

**REFERENCE 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, 2013.
3. A.C.Fernando: Corporate Governance, Principles, Policies and Practices, Pearson, 2012.
4. C.S.V.Murthy: Business Ethics, Himalaya Publishing House, 2012.
5. N.Balasubramanian : Corporate Governance and Stewardship, TMH,2012.
6. Nina Godbole & Sunit Belapure " Cyber Security" wiley india 2012.
7. Joseph W.Weiss : Business Ethics, Thomson, 2006.
8. Geethika,RK Mishra, Corporate Governance Theory and Practice,Excel,2011.
9. Dr.S.S.Khanka, Business Ethics and Corporate Governance, S.Chand, 2013.
10. K.PraveenParboteeach, Business Ethics, Routledge, 2013.
11. Praveen B Malla, Corporate Governance, Routledge 2010.
12. H.C.Mruthyunjaya, Business Ethics and Value Systems, PHI, 2013
13. V Balachandram, V Chandrasekaran, Corporate Governance, Ethics and Social Responsibility, PHI, 2011
14. Khanka, Business Ethics and Corporate Governance, S. Chand, 2013


**COURSE OUTCOMES:**

On completion of the course students will be able to:

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 Cybercrime and Cyber Terrorism.
4. Predict stakeholder's roles in corporate Governance.
5. Review committee Reports on development of Corporate Governance.

****END****

## (A30477) FUNDAMENTALS OF EMBEDDED SYSTEMS (OPEN ELECTIVE)

**B. Tech (CSE)**

| L | T | P | C |
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**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 BOOK:**

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, 2013
3. An Embedded Software Primer- David E Simon, Pearson Education

**Course outcomes:**

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

1. Explain the basics of embedded systems and classify its applications
2. Compare 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
5. Illustrate the concepts of shared memory and task communications

****END****

## (A30478) SENSORS& TRANSDUCERS
## (OPEN ELECTIVE)

**B. Tech (CSE)**

| L | T | P | C |
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**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, 2nd edition, 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:**

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

1. Explain the basic concepts of mechanical and electromechanical sensors, their electrical characteristics.
2. Analyze various capacitor sensors, ultrasonic sensors their electrical characteristics.
3. Compare and elaborate various thermal sensors, principle of operation.
4. Distinguish various magnetic sensors based on their operations, radiation sensors and their operation.
5. Analyze various film sensors and operation of different nano sensors and their applications.

**END**

**(A30358) INDUSTRIAL SAFETY ENGINEERING**

**(OPEN ELECTIVE)**

| | L | T | P | C |
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| **B. Tech (CSE)** | **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 equipments.
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 equipments.

****END****

## (A30360) WORK SYSTEM DESIGN
## (OPEN ELECTIVE)

| | L | T | P | C |
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| **B. Tech (CSE)** | **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, 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, 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, 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

****END****

## (A30256) ENERGY AUDIT & CONSERVATION
## (OPEN ELECTIVE-IV)

**B. Tech (CSE)**

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**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, 1998

**REFERENCES:**

1. Energy efficient electric motors by John.C. Andreas, Marcel Dekker Inc Ltd-2nd edition, 1995-
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**

On completion of the course, students will be able to

1. Explain the various methods of energy audit.
2. Illustrate the energy management strategies.
3. Perform energy audit in energy efficient motors
4. Relate the energy conservation with the improvement in energy efficiency and power factor.
5. Analyze the economic aspects to be considered in energy usage

****END****

## (A30257) NANO TECHNOLOGY
## (OPEN ELECTIVE)

**B. Tech (CSE)**

| L | T | P | C |
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**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, Wley India Edition, 2012.

**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 2000
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**

On completion of the course, students will be able to

1. Classify nanostructured materials
2. Illustrate the characteristics and properties of nano-materials.
3. Identify the synthesis routes of nano-materials
4. Make use of the tools to characterize the nano-materials.
5. Utilize the nano-materials for various applications

****END****

## (A30166) ENVIRONMENTAL PROTECTION AND MANAGEMENT (OPEN ELECTIVE)

**B. Tech (CSE)**

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**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, 1999.
2. ISO 14001/14004: Environmental management systems – Requirements and Guidelines – International Organisation for Standardisation, 2004
3. ISO 19011: 2002, "Guidelines for quality and/or Environmental Management System auditing, Bureau of Indian Standards, New Delhi, 2002
4. Paul L Bishop „Pollution Prevention: Fundamentals and Practice, McGraw- Hill International, Boston, 2000.
5. Environmental Management Systems: An Implementation Guide for Small and Medium-Sized Organizations, Second Edition, NSF International, Ann Arbor, Michigan, January 2001.

**Course Outcomes:**

1. Students are able to understand the meaning of environmental management.
2. Students are also able to understand the importance of environmental management
3. Development of society and country. It also explains how we can use natural resources in sustainable manner.
4. After completion of the course students will have knowledge of various acts and laws and will be able to identify the industries that are violating these rules
5. Students are able to understand importance of environmental rules for development of society

****END****

**(A30167) ALTERNATE BUILDING MATERIALS**
**(OPEN ELECTIVE)**

| | L | T | P | C |
|---|---|---|---|---|
| **B. Tech (CSE)** | **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:**

1. Students are able to understand the meaning of environmental management.
2. Students are also able to understand the importance of environmental management
3. Development of society and country. It also explains how we can use natural resources in sustainable manner.
4. After completion of the course students will have knowledge of various acts and laws and will be able to identify the industries that are violating these rules

5. Students are able to understand importance of environmental rules for development of society

****END****

## (C30167) MARKETING MANAGEMENT (OPEN ELECTIVE)

**B. Tech (CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**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. Marketing Management, Philip Kotler, Kevin Lane Keller, Pearson

**REFERENCE BOOKS**

1. Marketing, A south Asian prospective, Lamb, Hair, Sharma, Mcdaniel, Cenage
2. Marketing Asian Edition Paul Baines Chris Fill Kelly Page, Oxford
3. 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. Develop conceptual knowledge on consumer behavior, Marketing Mix and Product Mix
3. Outline Segmentation, targeting and Positioning Goods and Services in Market.
4. Illustrate marketing channels of distribution and Promotional mix
5. Identify Pricing Decisions and importance of digital Marketing.

****END****

## (C30168) INTELLECTUAL PROPERTY RIGHTS (OPEN ELECTIVE)

| | L | T | P | C |
|---|---|---|---|---|
| **B. Tech (CSE)** | **3** | **0** | **0** | **3** |

**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 secretes 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**

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, Prabuddha Ganguli, Tata Mc Graw Hill Publishing Company Ltd.

**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.

**END**

**(A30017) INDIAN CONSTITUTION**
**(MANDATORY COURSE)**

**B. Tech (CSE) VI Semester**

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 0 |

**UNIT-I**

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution- Sources and constitutional history, Features- Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy

**UNIT-II**

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions; State Government and its Administration Governor: Role and Position, CM and Council of ministers, State Secretariat: Organization, Structure and Functions

**UNIT-III**

**A:** Local Administration District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation,

**B:**Pachayati raj: Introduction, PRI: ZilaPachayat, Elected officials and their roles, CEO ZilaPachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

**UNIT-IV**

Concept and Development of Human Rights: Meaning Scope and Development of Human Rights, United Nations and Human Rights – UNHCR, UDHR 1948, ICCPR 1996 and ICESCR 1966, Human Rights in India: Protection of Human Rights Act, 1993 (NHRC and SHRC), First, Second and Third Generation Human Rights, Judicial Activism and Human Rights.

**UNIT-V**

Election Commission: Election Commission- Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women

**REFERENCE BOOKS:**

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd. NewDelhi

2. SubashKashyap, Indian Constitution, National BookTrust
3. J.A. Siwach, Dynamics of Indian Government &Politics
4. D.C. Gupta, Indian Government andPolitics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and PoliticsHans

**E-Resources:**

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

**Course Outcomes:**

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

1. Know the sources, features and principles of Indian Constitution.
2. Learn about Union Government, State government and itsadministration.
3. Get acquainted with Local administration and Pachayati Raj.
4. Be aware of basic concepts and developments of HumanRights.
5. Gain knowledge on roles and functioning of ElectionCommission.

****END****

## (A30018) ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE (MANDATORY COURSE)

**B. Tech (CSE) VI Semester**

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 0 |

**UNIT I**

**Introduction to traditional knowledge**: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

**UNIT II**

**Protection of traditional knowledge:** the need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

**UNIT III**

**Legal frame work and TK:**

**A**: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act);

**B:** The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.

**UNIT IV**

**Traditional knowledge and intellectual property:**

Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

**UNIT V**

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

**REFERENCE BOOKS**

1. Traditional Knowledge System in India, by Amit Jha,2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan2012.
3. Traditional Knowledge System in India by Amit Jha Atlantic publishers,2002

**E-RESOURCES**

1. https://www.youtube.com/watch?v=LZP1StpYEPM
2. http://nptel.ac.in/courses/121106003/

**Course Outcomes**

After completion of the course, students will be able to:

1. Understand the concept of Traditional knowledge and its importance.
2. Know the need and importance of protecting traditionalknowledge.
3. Know the various enactments related to the protection of traditional knowledge.
4. Understand the concepts of Intellectual property to protect the traditional knowledge
5. Compare and contrast the basics of Indian Traditional knowledge with modern scientific perspectivies.

****END****

## (A30559) INTRODUCTION TO DATA SCIENCE

**(OPEN ELECTIVE)**

**B. Tech (CSE)**

| L | T | P | C |
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| 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 BOOK:**

1. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media

2. Aurélien Géron, "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, Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press http://www.deeplearningbook.org
3. Jiawei Han and Jian Pei, "Data Mining Concepts and Techniques", Third Edition, Morgan Kaufmann 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 logisticregression, decision trees, neural networks and clustering.
4. Build data science applications using Python based toolkits.
5. Build data science applications using Python based toolkits.

**END**

**(A30557) WEB PROGRAMMING**
**(OPEN ELECTIVE)**

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| 3 | 0 | 0 | 3 |

**B. Tech**

**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 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 BOOK:**

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.

**REFERENCE BOOKS:**

1. Chris Bates, Web Programming
2. M. Srinivasan, Web Technology: Theory and Practice
3. Achyut S. Godbole, AtulKahate, Web Technologies
4. Kogent Learning Solutions Inc, Web Technologies Black Book
5. 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.)

**END**

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

**B. Tech**

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**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:**

1. 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.
5. Explain various learning approaches

**END**