ACADEMIC REGULATIONS

COURSE STRUCTURE AND

DETAILED SYLLABUS

ELECTRONICS AND COMPUTER ENGINEERING

B.TECH 4 YEAR UG COURSE

(Applicable for the batches admitted from 2018-2019)

REGULATION: R18

(I, II, III & IV Year Syllabus)

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

Institute Vision & Mission

Vision

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

Mission:

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

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Department Vision and Mission

Vision

To nurture excellence in the field of engineering and technology by imparting core values to the learners with focus on social responsibilities to mold the department into a center of excellence through Research and development.

Mission

- To prepare Electronics and Computer Engineering graduates with competence in engineering with interdisciplinary subjects, so that they can excel in professional career, to pursue higher studies and/or research and development activities.
- To develop liaison with Academia - Industry for exposure to the practical aspects in engineering, entrepreneurial pursuit and to promote social responsibility in the graduates.
- To inculcate technical skills and life skills with core values in students to improve their employability.

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UGC AUTONOMOUS
Bhaskar Nagar, Yenkapally, Moinabad, Hyderabad – 500075, Telangana, India

ACADEMIC REGULATIONS FOR B.TECH. REGULAR STUDENTS

WITH EFFECT FROM ACADEMIC YEAR 2018-19 (R-18)

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

J.B.Institute of Engineering and Technology (JBIET) offers a 4-year (8 semesters) **Bachelor of Technology** (B.Tech.) degree programme, under Choice Based Credit System (CBCS) with effect from the academic year 2018-19 in the following branches of Engineering:

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

2.0 Eligibility for admission

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

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

3.0 B.Tech. Programme structure

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

Each student shall secure 160 credits (with CGPA ≥ 5) required for the completion of the under graduate programme and award of the B.Tech. degree.

3.2 **UGC/AICTE** specified definitions/descriptions are adopted appropriately for

various terms and abbreviations used in these academic regulations/norms, which are listed below.

3.2.1 Semester Scheme

Each undergraduate programme is divided into 4 academic years (8 semesters) with each semester of 22 weeks of duration (16 weeks for instruction), each semester having 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. Choice Based Credit System (CBCS) and Credit Based Promotion System (CBPS) as indicated by UGC and curriculum/course structure as suggested by AICTE are followed.

3.2.2 Credit Courses

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

- One credit for one hour/week/semester for theory/lecture (L) courses or tutorials.
- One credit for two hours/week/semester for laboratory/practical (P) courses.

Courses like Environmental Science, Constitution of India, Intellectual Property Rights, and Gender Sensitization lab are mandatory courses. These courses will not carry any credits.

3.2.3 Subject Course Classification

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

S. No.	Broad Course Classification	Course Group / Category	Course Description
1	Foundation Courses (FnC)	BS – Basic Sciences	Includes Mathematics, Physics and Chemistry subjects
2		ES-Engg Sciences	Includes fundamental engineering subjects
3		HS – Humanities and Social sciences	Includes subjects related to humanities, social sciences and management
4	Core Courses (CoC)	PC – Professional Core	Includes core subjects related to the parent discipline/ department/ branch of Engineering.

5		Project Work	B.Tech. project or UG project or UG major project or Project Stage I & II
6		Industrial training/ Mini-project	Industrial training/ Summer Internship/ Industrial Oriented Mini-project/Mini-project
7	Elective Courses (EℓC)	PE – Professional Electives	Includes elective subjects related to the parent discipline/department/branch of Engineering.
8		OE – Open Electives	Elective subjects which include inter- disciplinary subjects or subjects in an area outside the parent discipline/department/branch of Engineering.
9		Seminar	Seminar/Colloquium based on core contents related to parent discipline/ department/ branch of Engineering.
10	Minor courses	-	1 or 2 Credit courses (subset of HS)
11	Mandatory Courses (MC)	-	Mandatory courses (non-credit)

4.0 Course registration

4.1 A 'faculty advisor or counselor' is assigned to a group of 20 students, who will advise the students about the under graduate programme, its course structure and curriculum, choice/option for subjects/ courses, based on their competence, progress, pre-requisites and interest.

4.2 A student is allowed to register for 160 credits in completion of B.Tech programme. However, they can register for additional credits (above 160 credits). The additional credits scored shall not be considered for award of division and also not considered for calculation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA). For such extra course(s) registered, a certificate will be issued with a letter grade indicated as a performance measure.

4.3 **Open Electives**: The students have to choose requisite number of open electives (as prescribed in the course structure) from the list of open electives given. However, the student cannot opt for an open elective subject offered by his own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.

4.4 **Professional Electives**: The students have to choose requisite number of professional electives (as prescribed in the course structure) from the list of professional electives given.

5.0 Subjects/ courses to be offered

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

5.2 A subject/ course may be offered to the students, **only if** a minimum of 30 students (1/2 of the section strength) opt for it. The maximum strength of a section is limited to 80 (60 + 1/3 of the section strength).

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

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

6.0 Attendance requirements:

6.1 A student is eligible to appear for the semester end examinations, if the student acquires a minimum of 75% of attendance in aggregate of all the subjects / courses (excluding attendance in mandatory courses) for that semester.

The attendance of Mandatory Non-Credit courses should be maintained separately.

6.2 Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned on medical grounds by the committee comprising of HOD of Concerned Department, Class incharge and 2 senior faculty members.

6.3 A stipulated condonation fee is payable for condoning of shortage of attendance. This fee will be informed time to time by the college administration.

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

6.5 A student detained in a semester due to shortage of attendance may be readmitted in the same semester in the next academic year for fulfillment of academic requirements. The academic regulations under which a student has been readmitted shall be applicable. However, no grade allotments or SGPA/ CGPA calculations will be done for the entire semester in which the student has been detained.

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

7.0 Academic requirements

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

7.1 A student is deemed to have fulfilled the minimum academic requirements and earned the credits allotted to each theory or practical or design or drawing course or project if he/she secures not less than 35% of marks (24 out of 70 marks) in the semester end examination and a minimum of 40% of marks in the sum total of the Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) taken together.

7.2 A student is deemed to have fulfilled the minimum academic requirements and earned the credits allotted to Industrial Oriented Mini Project /Summer Internship and seminar if the student secures not less than 40% marks in each of them.

7.3 A student may reappear once for each of the above evaluations, when they are scheduled again.

7.4 Promotion Rules

S. No.	Promotion	Conditions to be fulfilled
1	First year first semester to first year second semester	Regular course of study of first year first semester.
2	First year second semester to second year first semester	(i) Regular course of study of first year second semester. (ii) Must have secured at least 19 credits out of 38 credits i.e., 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Second year first semester to second year second semester	Regular course of study of second year first semester.
4	Second year second semester to third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 40 credits out of 80 credits i.e., 50% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester to third year second semester	Regular course of study of third year first semester.

6	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 61 credits out of 122 credits i.e., 50% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

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

7.6 A student **detained in a semester due to shortage of attendance may be re-admitted in the same semester in the next academic year for fulfillment of academic requirements**. The academic regulation under which a student has been readmitted is applicable. However, no grade allotments or SGPA/ CGPA calculations will be done for the entire semester in which the student has been detained.

7.7 A student detained **due to lack of credits, is promoted to the next academic year only after acquiring the required academic credits.** The academic regulation under which the student has been readmitted is applicable to him.

7.8 A student who fails to earn all the 160 credits as indicated in the program structure within eight academic years from the year of admission shall forfeit his seat in B.Tech Program, unless an extension is given by college Academic council to complete the program for a further period of two years.

8.0 Evaluation - Distribution and Weightage of marks

8.1 The performance of a student in every subject/course (including practical and Project Stage – I & II) will be evaluated for 100 marks each, with 30 marks allotted for CIE (Continuous Internal Evaluation) and 70 marks for SEE (Semester End-Examination).

8.2 For theory courses, during the semester there are 2 mid-term examinations (internal exams of 20 marks each), 5 unit tests of 5 marks each and 2 assignments carrying 5 marks each.

8.3 Each mid-term examination will be of 1 hour 20 minutes consisting of Part-A (objective questions) for 10 marks and Part-B (long answer) for 10 marks. The Part-A objective paper is set with 20 bits of multiple choice, fill-in the blanks and

matching type of questions. The Part- B consists of 4 questions each carrying 5 marks and student should answer any two questions.

8.4 Each Unit Test will be of 1 hour duration, consisting of 3 questions from that unit carrying 5 marks each and student should answer any two questions for 10 Marks. These 10 marks are scaled down to 5 for Unit Test marks calculation.

8.5 First mid-term examination is conducted for first 2 units of syllabus and second mid-term examination is conducted for remaining 3 units of syllabus.

8.6 The Continuous Internal Evaluation for theory course shall be made as average of marks obtained in CIE – I and CIE –II as detailed in the table below.

CIE – I	Marks	CIE - II	Marks
MID – I	20	MID - II	20
Best of Unit Test - I and Unit Test - II	5	Average of the best two of Unit Test – III, Unit Test – IV and Unit Test V	5
Assignment – I	5	Assignment - II	5
Total	30	Total	30

8.7 If a student is absent for any mid term examination, may be permitted to apply for makeup examinations within a week after completion of mid-term examinations on medical grounds. A subcommittee with the following composition will look into such cases.

Subcommittee-composition:

S.No	Faculty Member	Designation
1	Concerned Head of the Department	Chairman
2	Faculty nominated by Principal	Member
3	Senior faculty member of the concerned Department	Member
4	Class Teacher of the class	Member

8.7.1 The Semester End Examinations (SEE) will be conducted for 70 marks consisting of two parts viz. i) **Part- A** for 20 marks, ii) **Part - B** for 50 marks.

- Part-A is a compulsory question consisting of ten sub-questions. The first five sub-questions are from each unit and carry 1 mark each. The next five sub- questions are one from each unit and carry 3 marks each.
- Part-B consists of five questions (numbered from 2 to 6) carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an “either” “or” choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

8.7.2 For subjects like **Engineering Graphics/Engineering Drawing,** the SEE shall consist of five questions. For each question there will be an “either” “or” choice, which means that there will be two questions from each unit and the student should answer either of the two questions. There is no Part – A, and Part – B system.

8.7.3 For subjects like **Machine Drawing Practice/Machine Drawing**, the SEE is conducted for 70 marks consisting of two parts viz. (i) Part – A for 30 marks. 3 out of 4 questions must be answered, (ii) Part – B for 40 marks. Part – B is compulsory with a single question.

8.7.4 For the Subject **Estimation, Costing and Project Management**, the SEE paper should consist of Part- A, Part-B and Part C. (i) Part – A – 1 out of 2 questions from Unit – I for 25 Marks, (ii) Part – B – 1 out of 2 questions from Unit – II for 15 Marks, (iii) Part – C – 3 out of 5 questions from Units – III, IV, V for 30 Marks.

8.7.5 For subjects **Structural Engineering – I & II (RCC & STEEL),** the SEE will be conducted for 70 marks consisting of 2 parts viz. (i) Part – A for 15 marks and, (i) Part – B for 55 marks. Part – A is a compulsory question consisting of ten sub-questions. The first five sub-questions are from each unit relating to design theory and codal provisions and carry 2 marks each. The next five sub-questions are from each unit and carry 1 mark each. Part – B consists of 5 questions (numbered 2 to 6) carrying 11 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there is either or choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

8.8 For practical subjects there is a continuous internal evaluation during the semester for 30 marks and 70 marks for semester end examination. Out of the 30 marks for internal evaluation, day-to-day work in the laboratory is evaluated for 20 marks and internal practical examination is evaluated for 10 marks conducted by the laboratory teacher concerned. The semester end examination is conducted with an external examiner and the laboratory teacher. The external examiner is selected and appointed by the Principal from the list submitted by Head of the Department.

8.9 For the subject having design and/or drawing, (such as engineering graphics, engineering drawing, machine drawing, machine drawing practice and estimation), the distribution is 30 marks for continuous internal evaluation (20 marks for day-to-day work and 10 marks for internal tests) and 70 marks for semester end examination.

8.10 There is Life Skills and Professional Skills course offered for 2 credits and will be evaluated in IV year I semester as a laboratory course.

8.11 There is summer internship, in collaboration with an industry of their specialization, to be taken up during the vacation after II year II Semester examination and it will be evaluated in III Year I semester. A report to be submitted in prescribed format on the internship carried out by the student. The report will evaluated for 100 marks by the committee consisting of head of the department, and internship coordinator and a senior faculty member of the department. There is no semester end examination for the seminar

8.12 There is an Industry Oriented Mini Project, in collaboration with an industry of their specialization to be taken up during the vacation after III year II semester examinations. Industry Oriented Mini Project is submitted in a report form and presented before the committee in IV year I semester. It is evaluated for 100 marks by the committee consisting of Head of the Department, supervisor of the Industrial Oriented mini project and a senior faculty member of the department.

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

8.14 UG project work shall be carried out in two stages: Project Stage – I during IV Year I Semester, Project Stage – II during IV Year II Semester. Each stage will be evaluated for 100 marks. Student has to submit project work report at the end of each semester. First report includes project work carried out in IV Year I semester and second report includes project work carried out in IV Year I & II Semesters. SEE for both project stages shall be completed before the commencement of SEE Theory examinations..

8.15 For Project Stage – I, the Project Review committee (PRC) consisting of Head of the Department, project coordinator and two senior faculty members shall evaluate(SEE) the project work for 70 marks and project supervisor (CIE) shall evaluate for 30 marks. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together..

A student who has failed may reappear once for the above evaluation, when it is 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.

8.16 For Project Stage – II, the external examiner shall evaluate the project work for 70 marks and the project supervisor shall evaluate it for 30 marks. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the external examiner as per schedule, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together.

For conducting viva-voce of project stage – II, Principal selects an external examiner from the list of experts in the relevant branch submitted by the HODs of the College.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if student 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.

8.17 For mandatory courses of Environmental Science, Constitution of India, Intellectual Property Rights, and Gender Sensitization lab, a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in the continuous internal evaluation for passing the subject/course. **These marks should also be submitted along with the internal marks of other subjects.**

8.18 No marks or letter grades is printed in the Mark Statement for mandatory/non-credit courses. Only Pass/Fail is indicated in Grade Card.

9.0 Grading procedure

9.1 Grades will be awarded to indicate the performance of students in each theory subject, laboratory / practicals, seminar, Industry Oriented Mini Project, and project Stage - I & II. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 8 above, a corresponding letter grade is given.

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

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

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

9.4 To a student who has not appeared for an examination in any subject, '**Ab'** grade will be allocated in that subject, and he is deemed to have '**failed'**. A student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered next. In this case also, the internal marks in those subjects will remain the same as those obtained earlier.

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

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

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

9.7 A student passes the subject/ course only when **GP ≥ 5 ('C' grade or above).**

9.8 The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points (∑CP) secured from all subjects/ 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

SGPA = { $\sum^{N}_{i=1} C_i G_i$ } / { $\sum^{N}_{i=1} C_i$ } …. For each semester,

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

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

CGPA = { $\sum^{M}_{j=1} C_j G_j$ } / { $\sum^{M}_{j=1} C_j$ } … for all S number of semesters registered

(i.e., up to and inclusive of S semesters, S ≥ 2),

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

Illustration of calculation of SGPA:

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

SGPA = 152/21 = 7.24

Illustration of calculation of CGPA up to 3rd semester:

Semester	Course/Subject Title	Credits Allotted	Letter Grade Secured	Corresponding Grade Point (GP)	Credit Points (CP)
I	Course 1	3	A	8	24
I	Course 2	3	O	10	30
I	Course 3	3	B	6	18
I	Course 4	4	A	8	32
I	Course 5	3	A+	9	27
I	Course 6	4	C	5	20
II	Course 7	4	B	6	24
II	Course 8	4	A	8	32
II	Course 9	3	C	5	15
II	Course 10	3	O	10	30
II	Course 11	3	B+	7	21
II	Course 12	4	B	6	24
II	Course 13	4	A	8	32
II	Course 14	3	O	10	30
III	Course 15	2	A	8	16
III	Course 16	1	C	5	5
III	Course 17	4	O	10	40
III	Course 18	3	B+	7	21
III	Course 19	4	B	6	24
III	Course 20	4	A	8	32
III	Course 21	3	B+	7	21
	Total Credits	**69**		**Total Credit Points**	**518**

CGPA = 518/69 = 7.51

The above illustrated calculation process of CGPA will be followed for each subsequent semester until 8th semester. The CGPA obtained at the end of 8th semester will become the final CGPA secured for entire B.Tech. Programme.

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

9.11 SGPA and CGPA of a semester will be mentioned in the semester Memorandum of Grades if all subjects of that semester are passed in first attempt. Otherwise the SGPA and CGPA is mentioned only on the Memorandum of Grades in which sitting he passed his last exam in that semester. However, mandatory courses will not be taken into consideration.

10.0 Passing standards

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

10.2 After the completion of each semester, a grade card or grade sheet is 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.

11.0 Declaration of results

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

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

% of Marks = (final CGPA – 0.5) x 10

12.0 Award of degree

12.1 A student who registers for all the specified subjects/ courses as listed in the course structure and secures the required number of 160 credits (with CGPA ≥ 5.0), within 8 academic years from the date of commencement of the first academic year, is declared to have '**qualified'** for the award of B.Tech. degree in the chosen branch of Engineering selected at the time of admission.

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

12.3 A student with final CGPA > 8.00 (at the end of the under graduate programme), and fulfilling the following conditions - is placed in '**first class with distinction'**.
However, he

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

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

(iii) Should not have been detained or prevented from writing the semester end examinations in any semester due to shortage of attendance or any other reason.

A student not fulfilling any of the above conditions with final CGPA ≥ 8 is placed in **'first class'.**

12.4 Students with final CGPA (at the end of the under graduate programme) ≥ 6.50 but < 8.00 are placed in **'first class'.**

12.5 Students with final CGPA (at the end of the under graduate programme) ≥ 5.50 but < 6.50, are placed in '**second class'**.

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

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

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

13.0 Withholding of results

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

14.0 Student transfers

14.1 Transfer of students from other colleges or universities are permitted subjected to the rules and regulations of Telanga State Council for Higher Education (Technical Education Department) and JNTUH in vogue.

15.0 Scope

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

15.2 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.

15.3 The College may change or amend the academic regulations, course structure or syllabi at any time, and the changes or amendments made is applicable to all students with effect from the dates notified by the College authorities.

15.4 Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

ACADEMIC REGULATIONS FOR B.TECH. (LATERAL ENTRY SCHEME) FROM THE AY 2019-2020

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

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

2. The student shall register for 122 credits and secure 122 credits with CGPA ≥ 5 from II year to IV year B.Tech. programme (LES) for the award of B.Tech. degree.

3. The students, who fail to fulfill the requirement for the award of the degree in six academic years from the year of admission. However, he/she is permitted to write the examinations for two more years after six academic years of course work, failing which he/she shall forfeit his/her seat in B.Tech course.

4. The attendance requirement of B. Tech. (Regular) is applicable to B.Tech. (LES).

5. Promotion rule

S. No	Promotion	Conditions to be fulfilled
1	Second year first semester to second year second semester	Regular course of study of second year first semester.
2	Second year second semester to third year first semester	**(i)** Regular course of study of second year second semester. **(ii)** Must have secured at least 21 credits out of 42 credits i.e., 50% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Third year first semester to third year second semester	Regular course of study of third year first semester.
4	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 42 credits out of 84 credits i.e., 50% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

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

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

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

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

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

		examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of performance in that subject and all other subjects the student has appeared including practical examinations and UG major project of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 is reported to the Examination Result Processing Committee (ERPC) for further action to award a suitable punishment.	

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J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

Bhaskar Nagar, Yenkapally, Moinabad(M), RR Dist., Telangana-500075

ELECTRONICS AND COMPUTER ENGINEERING

COURSE STRUCTURE – R18

I B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	F110A	Mathematics – I	3	1-0-0	4
2	F110B	English	2	0-0-0	2
3	F115A	Programming for Problem Solving	3	0-0-0	3
4	F110D	Engineering Chemistry	3	1-0-0	4
5	F1101	English Language and Communication Skills Lab	0	0-2-0	1
6	F1107	Programming for Problem Solving Lab	0	0-4-0	2
7	F1102	Chemistry Lab	0	0-3-0	1.5
8		Induction Program			
		Total Credits	**11**	**2-9-0**	**17.5**

I B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	F120A	Mathematics – II	3	1-0-0	4
2	F122A	Basic Electrical Engineering	3	1-0-0	4
3	F120C	Applied Physics	3	1-0-0	4
4	F123A	Engineering Drawing and Computer Graphics	1	0-0-4	3
5	F1204	Basic Electrical Engineering Lab	0	0-2-0	1
6	F1202	Applied Physics Lab	0	0-3-0	1.5
7	F1205	Workshop and Manufacturing Practices Lab	1	0-4-0	3
		Total	**18**	**3-9-4**	**20.5**

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ELECTRONICS AND COMPUTER ENGINEERING

COURSE STRUCTURE – R18

II B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	F214A	Electronic Devices and Circuits	3	0-0-0	3
2	F215A	Data Structures	3	0-0-0	3
3	F217A	Computer Organization and Architecture	3	1-0-0	4
4	F214B	Digital Electronics	3	0-0-0	3
5	F210A	Mathematics – III	3	1-0-0	4
6	F210E	Professional Ethics	3	0-0-0	3
7	F2141	Electronic Devices and Circuits Lab.	0	0-2-0	1
8	F2151	Data Structures Lab.	0	0-3-0	1.5
9	F2143	Digital Electronics Lab	0	0-2-0	1
10	F210C	Gender Sensitization	2	0-0-0	0
		Total	**16**	**2-7-0**	**23.5**

II B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	F222C	Control Systems	3	1-0-0	4
2	F224E	Analog Electronics	3	0-0-0	3
3	F225A	Object Oriented Programming through Java	3	0-0-0	3
4	F220B	Managerial Economics and Financial Analysis	3	0-0-0	3
5	F220F	Environmental Science	2	0-0-0	0
6	F220D	Biological Sciences	2	0-0-0	2
7	F2251	Object Oriented Programming through Java Lab.	0	0-4-0	2
8	F2241	Analog Electronics Lab	0	0-3-0	1.5
		Total	**16**	**1-7-0**	**18.5**

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ELECTRONICS AND COMPUTER ENGINEERING

COURSE STRUCTURE – R18

III B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	F317A	Pulse and Digital Circuits	3	0-0-0	3
2	F317B	Database Management Systems	3	0-0-0	3
3	F317C	Operating Systems	2	1-0-0	3
4	F317D	Design and Analysis of Algorithms	3	0-0-0	3
5	F310A	Management Science	3	0-0-0	3
6	F3171	Pulse and Digital Circuits Lab	0	0-4-0	2
7	F3172	Database Management Systems Lab	0	0-4-0	2
8	F3173	Operating Systems Lab	0	0-4-0	2
9	F3174	Summer Internship	0	0-2-0	1
		Total	**14**	**1-14-0**	**22**

III B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	F327A	Compiler Design	2	1-0-0	3
2	F327B	Computer Networks	3	0-0-0	3
3		**Professional Elective – I**	3	0-0-0	3
4		**Professional Elective – II**	3	0-0-0	3
5		**Open Elective – I**	3	0-0-0	3
6	F3251	Compiler Design Lab	0	0-3-0	1.5
7	F3271	Computer Networks Lab	0	0-3-0	1.5
8	F3272	Microprocessors and Microcontrollers lab	0	0-4-0	2
		Total	**15**	**1-10-0**	**20**

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COURSE STRUCTURE – R18

IV B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1		**Professional Elective – III**	3	0-0-0	3
2		**Professional Elective – IV**	3	0-0-0	3
3		**Open Elective – II**	3	0-0-0	3
4		**Open Elective – III**	3	0-0-0	3
5	F4101	Life Skills and Professional Skills Lab	0	0-4-0	2
6	F4172	Industry Oriented Mini Project	0	0-4-0	2
7	F4171	Project Stage - I	0	0-8-0	4
		Total	**20**	**0-16-0**	**20**

IV B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1		**Professional Elective – V**	3	0-0-0	3
2		**Professional Elective – VI**	3	0-0-0	3
3		**Open Elective – IV**	3	0-0-0	3
4	F4271	Project stage – II	0	0-16-0	8
5	F4172	Seminar	0	0-2-0	1
		Total	**9**	0-18-0	**18**

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

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

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ELECTRONICS AND COMPUTER ENGINEERING

PROFESSIONAL ELECTIVE SUBJECTS

Professional Elective – I

Sl. No.	Code	Subject	L	T-P-D	C
1	F327C	Network Security	3	0-0-0	3
2	F327D	Data Analytics	3	0-0-0	3
3	F327E	Advanced Databases	3	0-0-0	3

Professional Elective – II

Sl. No.	Code	Subject	L	T-P-D	C
1	F327F	Microprocessors and Microcontrollers	3	0-0-0	3
2	F327G	Principles of Communication	3	0-0-0	3
3	F327H	Optical Communications	3	0-0-0	3

Professional Elective – III

Sl. No.	Code	Subject	L	T-P-D	C
1	F417A	Big Data Analytics	3	0-0-0	3
2	F417B	Neural Network	3	0-0-0	3
3	F417C	Internet of Things	3	0-0-0	3

Professional Elective – IV

Sl. No.	Code	Subject	L	T-P-D	C
1	F417D	VLSI Design	3	0-0-0	3
2	F417E	Cellular and Mobile Communications	3	0-0-0	3
3	F417F	Telecommunication Switching Systems and Networks	3	0-0-0	3

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ELECTRONICS AND COMPUTER ENGINEERING

PROFESSIONAL ELECTIVE SUBJECTS

Professional Elective – V

Sl. No.	Code	Subject	L	T-P-D	C
1	F427A	Embedded Systems	3	0-0-0	3
2	F427B	Image Processing and Pattern Recognition	3	0-0-0	3
3	F427C	Wireless Sensor Networks	3	0-0-0	3

Professional Elective – VI

Sl. No.	Code	Subject	L	T-P-D	C
1	F427D	Software Engineering	3	0-0-0	3
2	F427E	Cloud Computing	3	0-0-0	3
3	F427F	Data Mining	3	0-0-0	3

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COURSE STRUCTURE – R18

List of Subjects offered by various Board of Studies

Open Elective – I

S.No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	F32OA	Energy Audit and Green Building	Civil Engineering
2	F32OB	Environmental Impact Assessment	Civil Engineering
3	F32OC	Energy Storage systems	Electrical and Electronics Engineering
4	F32OD	Energy Auditing, Conservation and Management	Electrical and Electronics Engineering
5	F32OE	Automotive Technology	Mechanical Engineering
6	F32OF	Matlab Programming Language	Electronics and Communication Engineering
7	F32OG	Principles of communications	Electronics and Communication Engineering
8	F32OH	Database Management Systems	Computer Science and Engineering
9	F32OI	Operating Systems	Computer Science and Engineering
10	F32OJ	Introduction to Data Structures	Information Technology
11	F32OK	Introduction to web Design	Information Technology
12	F32OL	Internet of things	Electronics and Computer Engineering
13	F32OM	Introduction to Mining Technology	Mining Engineering

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COURSE STRUCTURE – R18

List of Subjects offered by various Board of Studies

Open Elective – II

S.No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	F41OA	Waste Management	Civil Engineering
2	F41OB	Estimation, Quantity Surveying and Valuation	Civil Engineering
3	F41OC	Electric and Hybrid vehicles	Electrical and Electronics Engineering
4	F41OD	Materials in Electrical Systems	Electrical and Electronics Engineering
5	F41OE	Fundamentals of Operations Research	Mechanical Engineering
6	F41OF	Digital systems Using VHDL	Electronics and Communication Engineering
7	F41OG	IC Technology	Electronics and Communication Engineering
8	F41OH	Computer Networks	Computer Science and Engineering
9	F41OI	Python Programming	Computer Science and Engineering
10	F41OJ	Computer Organization	Information Technology
11	F41OK	Human Computer Interaction	Information Technology
12	F41OL	Introduction to Embedded systems	Electronics and Computer Engineering
13	F41OM	Introduction to Surface Mining	Mining Engineering

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COURSE STRUCTURE – R18

List of Subjects offered by various Board of Studies

Open Elective – III

S.No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	F41ON	Elements of CIVIL Engineering	Civil Engineering
2	F41OO	Disaster Management	Civil Engineering
3	F41OP	Electric Costing And Estimation	Electrical and Electronics Engineering
4	F41OQ	Power Plant Engineering	Electrical and Electronics Engineering
5	F41OR	Fundamentals of Robotics	Mechanical Engineering
6	F41OS	Digital systems Using Verilog	Electronics and Communication Engineering
7	F41OT	Advanced Computer Architecture	Electronics and Communication Engineering
8	F41OU	Software Engineering	Computer Science and Engineering
9	F41OV	Cloud Computing	Computer Science and Engineering
10	F41OW	Java Programming	Information Technology
11	F41OX	Software Project Management	Information Technology
12	F41OY	Introduction to Intelligent System	Electronics and Computer Engineering
13	F41OZ	Introduction to Geology	Mining Engineering

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COURSE STRUCTURE – R18

List of Subjects offered by various Board of Studies

Open Elective – IV

S.No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	F42OA	Industrial Waste Water Treatment	Civil Engineering
2	F42OB	Air pollution and Control	Civil Engineering
3	F42OC	Distributed Generation And Micro grid	Electrical and Electronics Engineering
4	F42OD	Renewable Energy Sources	Electrical and Electronics Engineering
5	F42OE	Digital Manufacturing	Mechanical Engineering
6	F42OF	Embedded System Design	Electronics and Communication Engineering
7	F42OG	Software Defined Radio	Electronics and Communication Engineering
8	F42OH	E-commerce	Computer Science and Engineering
9	F42OI	Big Data Analytics	Computer Science and Engineering
10	F42OJ	Computer Forensics	Information Technology
11	F42OK	E-Disaster Management	Information Technology
12	F42OL	Introduction to Neural Networks	Electronics and Computer Engineering
13	F42OM	Introduction to Mine Environment	Mining Engineering

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B. Tech. ECM	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**1-0-0**	**4**

(F110A) MATHEMATICS-I
(LINEAR ALGEBRA & DIFFERENTIAL EQUATIONS)

(COMMON TO CE, EEE,ME,ECE,CSE,IT & ECM)

Course Objectives:

Students will learn to:

1. Understand the concept of matrices and solutions of system of linear equations
2. Learn the concept of eigen values and eigen vectors and cayley hamilton theorem
3. Learn the concept of sequences and series & nature
4. Get an idea to find the solutions of differential equations of first order and first degree
5. Find the solutions of second and higher order.

UNIT–I: MATRICES:

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:

Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT–III: SEQUENCES and SERIES:

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences. 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: FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS:

Exact, linear and Bernoulli's 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-V: ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type , sin , cos , polynomials in , ( ) and ( ); method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
3. R.K.Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 4th Edition, 2014.

References:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,11thReprint, 2010.

Course Outcomes:

After the completing the course the students will able to:

1. Solve system of linear equations
2. analyze the Eigen values and Eigen vectors which come across under linear transformations
3. find the nature of the given series by different tests.
4. Identify whether the given differential equation of first order is exact or not
5. Solve higher differential equation and apply the concept of differential equation to real world problems

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UGC AUTONOMOUS

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

(F110B) ENGLISH

(COMMON TO EEE,ME,ECE,CSE,IT&MIE)

Course Objectives:

Students will learn to:

1. Understand the concept of Raman Effect and concept in LSRW skills.
2. Acquire the knowledge in ancient architecture in India and Vocabulary
3. Learn how denim jeans were manufactured.
4. Know practice of healthy eating.
5. Know how to change their fortune

UNIT–I:

'The Raman Effect' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes.

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Basic Writing Skills: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – **Paragraph writing** – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT–II:

Ancient Architecture in India' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms, Homophones, Homonyms, and Homographs.

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Improving Comprehension Skills – Techniques for Good Comprehension

Writing: Format of a Formal Letter-**Writing Formal Letters** E.g.., Letter of Complaint, Letter of Requisition, and Job Application with Resume.

UNIT–III:

'Blue Jeans' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-skills of Reading- Skimming and Scanning

Writing: Nature and Style of Sensible Writing- **Defining- Describing** Objects, Places and Events– **Classifying**- Providing Examples or Evidence and Essay Writing

UNIT–IV:

'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published
by Cambridge University Press.

Vocabulary: Standard Abbreviations in English
Grammar: Redundancies and Clichés in Oral and Written Communication.
Reading: Comprehension- Intensive Reading and Extensive Reading
Writing: Writing Practices--Writing Introduction and Conclusion -Précis Writing.

UNIT-V:

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Technical Vocabulary and their usage
Grammar: Common Errors in English
Reading: Reading Comprehension-Exercises for Practice
Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports

Text Books:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

References:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007) Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006) Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

Course Outcomes:

Students will be able to:

1. Find the nature of diffraction and use lsrw skills in his day to day life conversations.
2. Implement in the construction field.
3. Design different models in manufacturing jeans.
4. Discuss balanced eating habits with everyone.
5. implement in their own life.

J. B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

(F115A) PROGRAMMING FOR PROBLEM SOLVING

(Common to EEE, ECE&ECM)

Course Objectives:

Students will learn to:

1. Learn the fundamentals of computers.
2. Understand the various steps in program development.
3. Understand the syntax and semantics of C programming language.
4. Learn the usage of structured programming approach in solving problems.
5. Gain the knowledge on searching and Sorting methods.

UNIT–I:

Introduction to Programming

Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems.

Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming.

Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments

Bitwise operations: Bitwise AND, OR, XOR and NOT operators Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do- while loops. I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.

UNIT–II:

Arrays, Strings, Structures and Preprocessor:

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays.

Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings.

Structures: Defining structures, initializing structures, unions, Array of structures.
Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef.

UNIT–III:

Pointers and File handling in C:

Pointers: Idea of pointers, defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self-referential structures in linked list (no implementation) Enumeration data type.

Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

UNIT–IV:

Function and Dynamic Memory Allocation:

Functions: Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries.

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions.

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types.

UNIT-V:

Introduction to Algorithms:

Basic searching algorithms (linear and binary search techniques), Basic sorting algorithms (Bubble, Insertion, Quick, Merge and Selection sort algorithms) Basic concept of order of complexity through the example programs.

Text Books:

1. Programming in C, Reema Thareja. Oxford university press.
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

References:

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
5. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

Course Outcomes:

Students will be able to:

1. Convert the algorithms/flowcharts to C programs.
2. Code and test a given logic in C programming language.
3. Decompose a problem into functions and to develop modular reusable code.
4. Use arrays, pointers, strings and structures to write C programs.
5. Implement Searching and sorting problems.

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B. Tech. ECM	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**1-0-0**	**4**

(F110D) ENGINEERING CHEMISTRY
(Common to ECE, EEE & ECM)

Course Objectives:

Students will learn to:

1. The suitability of water for domestic and industrial purposes.
2. Adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
3. The principles of electrochemistry and corrosion.
4. The knowledge of chemical reactions those are used in the synthesis of molecules.
5. The importance of spectroscopic techniques and molecular energy levels.

UNIT–I: ATOMIC STRUCTURE AND THEORIES OF BONDING:

Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N2, O2, F2, CO and NO. Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral, Octahedral and square planar geometries. Band structure of solids and effect of doping on conductance.

UNIT–II: WATER AND ITS TREATMENT:

Introduction – hardness of water – Causes of hardness - Types of hardness: temporary and permanent – expression and units of hardness – Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization. Boiler feed water and its treatment – Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange process. Desalination of water – Reverse osmosis. Numerical problems.

UNIT–III: ELECTROCHEMISTRY AND CORROSSION:

Electro chemical cells – electrode potential, standard electrode potential, types of electrodes – calomel, Quinhydrone and glass electrode. Nernst equation, determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Numerical problems. Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery).

Corrossion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods-Cathodic protection – Sacrificial anode and impressed current cathodic methods. Surface

coatings – metallic coatings – techniques of coating-hot dipping, cementation and electroplating of Copper.

UNIT–IV: SPECTROSCOPIC TECHNIQUES AND APPLICATIONS:

Principles of spectroscopy, selection rules and applications of electronic spectroscopy. Vibrational and rotational spectroscopy. Basic concepts of Nuclear magnetic resonance Spectroscopy, chemical shift. Introduction to Magnetic resonance imaging.

UNIT-V: REACTION MECHANISM AND SYNTHESIS OF DRUG MOLECULES:

Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN1, SN2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule. Oxidation reactions: Oxidation of alcohols using $KMnO_4$ and chromic acid. Reduction reactions: reduction of carbonyl compounds using $LiAlH_4$ & $NaBH_4$. Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

Text Books:

1. Engineering Chemistry by P. C. Jain & M. Jain; Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
2. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
3. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N. E. Schore, 5th Edition.
4. University Chemistry, by B.M. Mahan, Pearson IV Edition.
5. Physical Chemistry, by P.W. Atkins
6. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan

References:

1. Engineering Chemistry (NPTEL web book) by B. L. Tembe, Kamaluddin and M.S.Krishnan
2. Stereochemistry of organic compounds by D.Narsipuri published by New age international publishers

Course Outcomes:

Students will be able to:

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. Quantum theory is more than 100 years old and to understand phenomena at nanometer levels; one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

1. Students will be able to analyze microscopic chemistry in terms of atomic and molecular orbitals
2. Students will be able to understand the suitability of water for domestic and industrial purposes
3. Students will be able to apply their knowledge in solving related engineering problems.
4. Students will be able to synthesize drug molecules
5. Students can distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques

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

(F1101) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

(COMMON TO EEE,ME,ECE,CSE,IT&MIE)

Course Objectives:

Students will learn to:

1. Recognize sounds of English.
2. Apply stress and intonation while speaking.
3. Develop Listening skills.
4. Develop introducing himself and others.
5. Understand how to describe, debate and knows the types of presentations.

SYLABUS:

English Language and Communication Sills Lab (ELCS) will have two parts:

a) **Computer Assisted Language Learning (CALL) Lab:**
b) **Interactive Communication Skills (ICS) Lab:**

Exercise – I: CALL Lab:

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

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab: Understand: Communication at Work Place- Spoken vs. Written language. Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II: CALL Lab:

Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab:

Understand: Features of Good Conversation – Non-verbal Communication.

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

Exercise – III: CALL Lab:

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

Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab:

Understand: How to make Formal Presentations.

Practice: Formal Presentations.

Exercise – IV:

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks.

Practice: Making a Short Speech – Extempore.

Exercise – V:

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Interview Skills.

Practice: Mock Interviews.

Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-study by students. **System Requirement (Hardware component):** Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

Computers with Suitable Configuration

High Fidelity Headphones

Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public-Address System, a LCD and a projector etc.

Course Outcomes:

Students will be able to:

1. Analyze and use correct pronunciation.
2. Make use of stress and intonation properly while speaking and writing.
3. Tell the answers effectively after listening
4. Describe himself and others in day to day life situations.
5. Improve in handling debates and oral presentation

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

(F1107) PROGRAMMING FOR PROBLEM SOLVING LAB

(Common to EEE, ECE&ECM)

Course Objectives:

Students will learn to:

1. To work with an IDE to create, edit, compile, run and debug programs
2. To analyze the various steps in program development.
3. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
5. To Write programs using the Dynamic Memory Allocation concept, files

1. Simple numeric problems:

1. Write a program for find the max and min from the three numbers.
2. Write the program for the simple, compound interest.
3. Write program that declares Class awarded for a given percentage of marks, where
   mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.

2. Expression Evaluation:

1. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
2. Write a program that finds if a given number is a prime number
3. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence. d)Write a C program to find the roots of a Quadratic equation.

3. Arrays and Pointers and Functions:

1. Write a C program to find the minimum, maximum and average in an array of integers.
2. Write a C program to find Addition of Two Matrices
3. Write a C program to find Multiplication of Two Matrices
4. Write C programs that use both recursive and non-recursive functions

5. Write a program for reading elements using pointer into array and display the values using array.

4.Files:

1. Write a C program to display the contents of a file to standard output device.
2. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
3. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.

5.Strings:

1. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
2. Write a C program to count the lines, words and characters in a given text.

6. Sorting and Searching:

1. Write a C program for using binary search method.
2. Write a C program for linear search.
3. Write a C program that implements the Bubble sort method.
4. Write a C program that implements the Insertion sort method.
5. Write a C program that implements the Quick sort method.
6. Write a C program that implements the Merge sort method.

ADDITIONAL PROGRAMS (Given to Students as Assignment):

1) Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:
   a) 5 x 1 = 5
   b) 5 x 2 =10
   c) 5 x 3 =15
2) Write a program that shows the binary equivalent of a given positive number between 0 to255.
3) Write a C program to find the sum of individual digits of a positive integer and test given
   Number is palindrome.
4) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
5) Write a C program to calculate the following, where x is a fractional value. 1-x/2+x^2/4-
   x^3/6.
6) Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:1+x+x^2+x^3+ . . . . .+x^n. For example: if n is3 and xis 5, then the program computes 1+5+25+125.

7) Write a C program to find the minimum, maximum and average in an array of integers.
8) Write a functions to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.
9) Write a C program that uses functions to perform the following:
   (a) Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.
   (b) To find the factorial of a given integer.
   (c) To find the GCD (greatest common divisor) of two given integers.
10) Write a C program that does the following:
   (a) It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function) Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function). The program should then read all 10 values and print them back.
   (b) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).
11) Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
12) Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
13) Write a C program that uses functions to perform the following operations:
   (a)To insert a sub-string in to a given main string from a given position.
   (b) To delete n Characters from a given position in a given string.
14) Write a C program to construct a pyramid of numbers as follows:

```
1          *          1          1          *
1 2        * *        2 3        2 2        * *
1 2 3      * * *      4 5 6      3 3 3        * * *
                                 4 4 4 4    * *
                                             *
```

Write a C program that sorts a given array of names.

References:

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

Course Outcomes:

Students will be able to:

1. formulate the algorithms for simple problems
2. correct syntax errors as reported by the compilers
3. represent and manipulate data with arrays, strings and structures
4. use pointers of different types, functions
5. create, read and write to and from simple text and binary files

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B. Tech. ECM	**L**	**T-P-D**	**C**
I Year - I Semester	**0**	**0-3-0**	**1.5**

(F1102) CHEMISTRY LABORATORY

(COMMON TO ECE, EEE & ECM)

Course Objectives:

Students will learn to:

1. estimation of hardness and chloride content in water to check its suitability for drinking purpose.
2. to determine the rate constant of reactions from concentrations as a function of time.
3. the measurement of physical properties like adsorption and viscosity.
4. to synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (tlc) technique.
5. to measure the conductance and emf values of solutions

Experiments:

1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry
3. Estimation of an HCl by Conductometric titrations
4. Estimation of Acetic acid by Conductometric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe^{2+} by Potentiometry using KMnO4
7. Estimation of amount of Cu^{+2} by Colorimetry
8. Estimation of amount of KMnO4 by Colorimetry
9. Synthesis of Aspirin and Paracetamol
10. Determination of acid value of coconut oil
11. Thin layer chromatography calculation of Rf values. eg ortho and para nitro phenols
12. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
13. Determination of partition coefficient of acetic acid between n-butanol and water.
14. Determination of surface tension of a give liquid using stalagmometer.

References:

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi)
3. Vogel's text book of practical organic chemistry 5th edition
4. Text book on Experiments and calculations in engineering chemistry – S.S. Dara

Course Outcomes:

Students will be able to:

1. determination of parameters like hardness and chloride content in water.
2. estimation of rate constant of a reaction from concentration – time relationships.
3. determination of physical properties like adsorption and viscosity.
4. calculation of r_f values of some organic molecules by tlc technique.
5. students can be able to determine the partition coefficient of a organic compound in two immissible liquids.

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B. Tech. ECM	**L**	**T-P-D**	**C**
I Year - II Semester	**3**	**1-0-0**	**4**

(F120A) MATHEMATICS-II
(ADVANCED CALCULUS)

(COMMON TO CE, EEE,ME,ECE,CSE,IT & ECM)

Course Objectives:

Students will learn to:

1. Geometrical approach to the mean value theorems and their application to the mathematical problems & Evaluation of improper integrals using Beta and Gamma functions.
2. Finding maxima and minima of function of two and three variables
3. Evaluation of multiple integrals and their applications
4. The physical quantities involved in engineering field related to vector valued functions.
5. The basic properties of vector valued functions and their applications to line, surface and volume integrals

UNIT–I: CALCULUS: (10L) 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), Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT–II: MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS): (8L)

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.

UNIT–III: MULTIVARIABLE CALCULUS (INTEGRATION): (10L)

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), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelopiped).

UNIT–IV: VECTOR DIFFERENTIATION (10L)

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 (10L)

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
3. R.K.Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 4th Edition, 2014.

References:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, LaxmiPublications, Reprint, 2008.
2. G.B.Thomas and R.L.Finney, Calculus and Analytic Geometry, 9th Edition, Pearson, Reprint, 2010.

Course Outcomes:

Students will be able to:

1. Solve the applications on the mean value theorems.
2. Evaluate the improper integrals using Beta and Gamma functions.
3. Find the extreme values of functions of two variables with/ without constraints.
4. Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelepiped.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

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B. Tech. ECM	**L**	**T-P-D**	**C**
I Year - II Semester	**3**	**1-0-0**	**4**

(F122A) BASIC ELECTRICAL ENGINEERING

(COMMON TO EEE,ECE & ECM)

Course Objectives:

Students will learn to:

1. To introduce the concept of electrical circuits using network laws and theorems.
2. To outline and analyse single phase A.C and three phase A.C circuits.
3. To study and understand magnetic circuits and transformers.
4. To understand the different types of D.C and A.C rotating electrical machine.
5. To import the knowledge of protection and switch gear of electrical components.

UNIT–I:

DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, analysis of simple circuits with DC excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT–II:

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase AC circuits consisting of R, L, C, RL, RC and RLC series combinations, resonance in series RLC circuit. Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT–III:

Transformers: Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT–IV:

Rotating Electrical Machines: D.C Motors - principle of operation, characteristics, speed control and application of series and shunt motor. Three-phase induction motor - construction, generation of rotating magnetic fields, principle of operation, torque-slip characteristics. Single-phase induction motor - construction, working, torque-speed characteristic.

UNIT-V:

Electrical Installations: Components of LT switchgear: Switch fuse unit (SFU), MCB, ELCB, MCCB, types of wires and cables, earthing. Types of batteries, important characteristics for batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Text Books:

1. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
3. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.

References:

1. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
2. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.

Course Outcomes:

Students will be able to:

1. Illustrate and solve electrical circuits using network laws and theorem.
2. Acquire knowledge about the single phase and three phase electrical circuits.
3. Get exposure of magnetic circuits and transformers.
4. Demonstrate the working principle of electrical machines.
5. To introduce components of low voltage electrical installation.

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B. Tech. ECM	**L**	**T-P-D**	**C**
I Year - II Semester	**3**	**1-0-0**	**4**

(F120C) APPLIED PHYSICS

(Common to EEE,ECE,CSE,IT&ECM)

Course Objectives:

Students will learn to:

1. Demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
2. Demonstrate competency and understanding of the concepts found in quantum mechanics, semiconductor physics, fiber optics and lasers and electromagnetic theory and a broad base of knowledge in physics.
3. Solve non-traditional problems that potentially draw on knowledge in multiple areas of physics.
4. Study applications in engineering like memory devices, transformer core and electromagnetic machinery.
5. To study semiconductor physics, fiber optics and lasers and electromagnetic theory and a broad base of knowledge in physics.

UNIT–I:

Quantum Mechanics:

Introduction to quantum physics, Black body radiation, Planck's law, Photoelectric effect, Compton effect, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.

UNIT–II:

Electronic Materials:

Classical Free electron theory, Quantum free electron theory, Fermi energy level, Occupation probability, Density of States, Bloch Theorem, Kronig- Penny model, E-K Diagram, Effective mass of Electron, Band Theory of solids, Classification of materials.

UNIT–III:

Semiconductor Physics:

Intrinsic and Extrinsic semiconductors, Carrier Concentration in intrinsic and extrinsic Semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction diode, V-I Characteristic, Diode equation(qualitative treatment), Zener diode , Hall effect, LED, Photo diode and Solar cell.

UNIT–IV:

Lasers and Fibre Optics:

Lasers: Introduction, absorption, spontaneous emission, Stimulated emission, calculation of Einstein co-efficient, Population inversion, Pumping, Lasing action, Types of Lasers: Ruby laser, He-Ne laser, Semiconductor laser, Applications of laser.

Fibre Optics: Introduction, Construction and working principle of Optical fibre, Acceptance angle, Acceptance cone and Numerical aperture, Types of optical fibres, Applications of optical fibres.

UNIT-V:

Electromagnetism:

Laws of electrostatics, Electric current and the continuity equation, Ampere's and Faraday's laws, Maxwell's equations, The wave equation: Plane Electromagnetic waves in vacuum, their Transverse nature, Polarisation, Permittivity and Dielectric constant, Internal fields in a solid, Clausius-Mossotti equation, Ferroelectrics and Piezoelectric.

Text Books:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learing.
2. Physics, Halliday and Resnick, - Wiley.
3. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - Chand

References:

1. Richard Robinett, Quantum Mechanics
2. Semiconductor Optoelectronics: Physics and Technology, J.Singh, Mc Graw-Hill inc. (1995).
3. Online Course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Guptha on NPTEL.
4. P.K.Palanisamy, "Engineering Physics", Scitech Publications, Fourth edition.

Course Outcomes:

Students will be able to:

1. Learn the fundamental concepts on Quantum behaviour of matter in its micro state.
2. Get the knowledge of fundamentals of Semiconductor physics, Lasers and fibre optics enable the students to apply to various systems like communications, solar cell, photo cells and so on.
3. Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications.
4. Be exposed to the phenomena of electromagnetism and also to have exposure on magnetic materials and dielectric materials.
5. Lasers and fibre optics enable the students to apply to various systems like communications, solar cell, photo cells and so on.

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B. Tech. ECM	**L**	**T-P-D**	**C**
I Year - II Semester	**1**	**0-0-4**	**3**

(F123A) ENGINEERING DRAWING & COMPUTER GRAPHICS (Theory and Lab)

(COMMON TO CE, EEE,CSE,IT & ECM)

Course Objectives:

Students will learn to:

1. Learn a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety,
2. Prepare to communicate effectively.
3. Learn to use the techniques, skills, and modern engineering tools necessary for engineering practice.
4. Learn Projections of Solids.
5. Learn computer-aided drawings

UNIT–I:

INTRODUCTION TO ENGINEERING DRAWING (2 Lecture classes and 8 Practical's):
Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloids, Hypocycloid and In volute.

UNIT–II:

ORTHOGRAPHIC PROJECTIONS AND PROJECTIONS OF POINTS, LINES AND PLANES (2 Lecture classes and 12 Practical's): Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined to both the Planes- Draw simple annotation, dimensioning and scale.

UNIT–III:

PROJECTIONS OF REGULAR SOLIDS AND SECTIONAL VIEWS OF RIGHT REGULAR SOLIDS (2 Lecture Classes And 12 Practical's): Projections of regular solids - Prism, Cylinder, Pyramid, Cone – Auxiliary Views; , Draw the sectional views of geometrical solids.

UNIT–IV:

ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS (2 Lecture classes and 12 Practical's): Principles of Isometric projection – Isometric Scale, Isometric Views, Conversion of Isometric Views to Orthographic Views and Vice-versa.

UNIT-V:

OVERVIEW OF COMPUTER GRAPHICS (**2 Lecture classes and 16 Practical's):** Drafting Software: Computer Aided Drafting (CAD) – Drafting Software – Manual Drafting vs Auto CAD Drafting. Auto CAD commands: Starting Auto CAD - Auto CAD commands – (Generation of Points, Lines, Curves and Polygons) - Editing and Modifications - Drafting Settings - Dimensioning and Text - Geometrical Constructions. Projection of Points - Straight Lines - Plane surfaces – Solids - Isometric projections

Note: CAD Lab facility is required for this unit.

(Only theory Question to be set from this Unit for Examinations

Text Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. K. Venugopal & V. Prabhu Raja (2011), Engineering Drawing + Auto CAD, New Age International Publishers. Fifth Edition.
3. CAD Software Theory and User Manuals

References:

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

Course Outcomes:

Students will be able to:

1. Able to understand engineering drawing and its place in society
2. Exposed to the visual aspects of engineering drawing and graphics
3. Exposed to engineering graphics standards
4. Exposed to solid modeling
5. Exposed to computer-aided geometric design.

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

(F1204) BASIC ELECTRICAL ENGINEERING LAB

(COMMON TO EEE,ECE & ECM)

Course Objectives:

Students will learn to:

1. Analyze a given network by applying various electrical laws and network theorems
2. Know the response of electrical circuits for different excitations.
3. Calculate, measure and know the relation between basic electrical parameters
4. Analyze the performance of single phase and three phase transformers.
5. Analyze the performance characteristics of dc and ac electrical machines.

Choice of 10-12 experiments from the following

List of Experiments

1. Verification of Ohms Law.
2. Verification of KVL and KCL.
3. Transient response of series RL and RC circuits using DC excitation.
4. Transient response of RLC series circuit using DC excitation.
5. Resonance in series RLC circuit.
6. Calculations and verification of impedance and current of RL, RC and RLC series circuits.
7. B-H loop for single phase transformers.
8. Measurement of voltage, current and real power in primary and secondary circuits of a single phase transformer.
9. Load test on single phase transformer (Calculate Efficiency and Regulation).
10. Three phase transformer: Verification of relationship between voltages and currents (Star-Delta, Delta-Delta, Delta-star, Star-Star).
11. Measurement of active and reactive power in a balanced three-phase circuit.
12. Performance Characteristics of a DC Shunt Motor.
13. Torque-Speed Characteristics of a DC Shunt Motor.
14. Performance Characteristics of a Three-phase Induction Motor.
15. Torque-speed Characteristics of a Three-phase Induction Motor.

Course Outcomes:

Students will be able to:

1. Get an exposure to basic electrical laws.
2. Relate the response of different types of electrical circuits to different excitations.
3. Understand the measurement, calculation and relation between the basic electrical parameters
4. Inspect the basic characteristics of transformers.
5. Inspect the basic characteristics of Dynamic electrical machines

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B. Tech. ECM	**L**	**T-P-D**	**C**
I Year - II Semester	**0**	**0-3-0**	**1.5**

(F1202) APPLIED PHYSICS LAB

(Common to EEE,ECE,CSE,IT&ECM)

Course Objectives:

Students will learn to:

1. Demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
2. Demonstrate competency and understanding of the concepts found in LED, Electric and Electronic materials a broad base of knowledge in physics.
3. Solve Experimental problems that potentially draw an experimental knowledge in multiple areas of physics.
4. Study applications in engineering like Hall effect, and magnetic properties.
5. Study applications in engineering like Optical fiber, LASER, Photodiode and Solar cell.

List of Experiments:

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. Optical fiber: Determination of Numerical Aperture.
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 Wave length of LASER Source.
8. Dielectric constant: To determine the Dielectric constant of the given material.
9. LCR Circuit: To determine the Quality factor of LCR Circuit (Series & Parallel).
10. R-C Circuit: To determine the time constant of R-C circuit (Growth and Decay).

References:

1. Experiments in Applied Physics" (Physics Lab Manual 4th edition) , Dr. Narendra, L. Mathakari
2. " Engineering Physics Lab Manual" By Department of Physics JBIET

Course Outcomes:

Students will be able to:

1. Learn the experimental concepts on in LED, Electric and Electronic materials.
2. Get the knowledge of fundamentals of Semiconductor physics.

3. Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications.
4. Be exposed to the phenomena of electromagnetism and also to have exposure on magnetic materials and dielectric materials.
5. Lasers and fibre optics enable the students to apply to various systems like communications, solar cell, photo cells and so on.

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B. Tech. ECM	**L**	**T-P-D**	**C**
I Year - II Semester	**1**	**0-4-0**	**3**

(F1205) WORKSHOP AND MANUFACTURING PRACTICES

(COMMON TO CE, ME,ECE & ECM)

Course Objectives:

Students will learn to:

1. Learn fabricating small components using engineering tools and machines.
2. Understand the working principles of maintaining dimensional accuracies and dimensional tolerances in different manufacturing processes.
3. Understand assembly of various components.
4. Understand the Tools used for different trades
5. Learn Plumbing works like pipe joints

(I)WORKSHOP AND MANUFACTURING PRACTICES – 10 Lecture hours

1. Brief introduction to Manufacturing processes: –
    a. machining on lathe, milling and drilling machines,
    b. basic process involved in the casting,
    c. brief process of forging, forming,
    d. metal joining, brief process of gas welding **(3 hours)**
2. Demo of working of CNC machine **(2 hours)**
3. Fitting operations & power tools **(1 hour)**
4. Electric house wiring **(1 hour)**
5. Carpentry **(1 hour)**
6. Metal casting **(1hour)**
7. Welding (arc welding & gas welding), brazing **(1hour)**

(II) WORKSHOP PRACTICE: 60 hours

1. Machine shop **(12 hours) - on Lathe, Milling and drillling**
2. Fitting shop **(8 hours)**
3. Carpentry **(8 hours)**
4. Electrical house wiring **(8 hours)**
5. Welding shop **(8 hours (Arc welding 4 hrs + gas welding 4 hrs)**
6. Foundry practices – mould preparation **(8 hours)**
7. Smithy – Black smithy and Tin smithy **(8 hours)**

Text Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., “Elements of Workshop Technology”, Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.

2. Kalpakjian S. And Steven S. Schmid, “Manufacturing Engineering and Technology”, 4th edition, Pearson Education India Edition, 2002.
3. Gowri P. Hariharan and A. Suresh Babu,”Manufacturing Technology – I” Pearson Education, 2008.

References:

1. Roy A. Lindberg, “Processes and Materials of Manufacture”, 4th edition, Prentice Hall India, 1998.
2. Rao P.N., “Manufacturing Technology”, Vol. I and Vol. II, Tata McGrawHill House, 2017.

Course Outcomes:

Students will be able to:

1. Fabricate components with their own hands.
2. Get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
3. Produce small components of their interest by assembly.
4. Identify the tools used in workshop & different trades.
5. Perform plumbing works using the required tools

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

(F214A) ELECTRONIC DEVICES AND CIRCUITS

(Common to ECM, ECE, EEE **)**

Course Objectives:

Students will learn to:

1. PN junction diode operation, characteristics and applications
2. Transistor characteristics in various configurations
3. FET & MOSFET operations & Characteristics
4. Biasing of BJT & FET and various models
5. Fabrication of integrated circuits

UNIT–I: Applications of P-N Junction diode

V-I characteristics of P-N Junction as a diode, the PN- 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, π- Section filters, comparison of filters, DC-power supply circuit design.

Special Diodes: Zener Diode, Avalanche and Zener Breakdown, V-I characteristics of Zener Diode, voltage regulator using Zener diode, Tunnel diode construction and working (using Energy Band diagram), Schottky diode, Photo diode, UJT, SCR their construction and V-I characteristics

UNIT–II: Transistor (BJT) Characteristics

Introduction to Bi-polar Junction Transistor, Different configurations, current components in a junction transistor, V-I characteristics in CE and CB configurations.
Eber Molls model for a transistor, Small Signal Model for BJT.

UNIT–III: Field Effect Transistors (FET)

Comparison of BJT & FET, Construction & Operation of JFET, V-I characteristics of JFET, Determination of FET Parameters from the V-I characteristics. MOSFET Construction & Operation in Enhancement and Depletion modes, V-I characteristics of MOSFET.

UNIT–IV: Biasing & Small Signal Models for Transistors (BJT & FET)

Need for Biasing of transistors, Determination of Quiescent point from the CE characteristics, stability factors S, Introduction to fixed bias, Self-bias, collector to base bias. Transistor circuits for Quiescent point and stability factor S. H-Parameter equivalent

circuit for BJT. Definition & Determination of h-Parameters from CE V-I Characteristics, Small Signal Models for FET. Transistors Biasing of FET, Self-Bias.

UNIT-V: Integrated circuit fabrication process Basic Monolithic Integrated Circuits, Integrated Resistors, Capacitors & inductors Epitaxial Growth Masking and Etching oxidation, diffusion, ion implantation, photolithography, Monolithic circuit layout, chemical vapor deposition, sputtering, twin-tub CMOS process.

Text Books:

1. Electronic Devices and Circuits Millman & Halkias McGraw Hill (Mandatory)
2. Integrated Electronics Millman & Halkias McGraw Hill

References:

1. G. Streetman, and S. K. Banerjee, “Solid State Electronic Devices,” 7th edition, Pearson,2014.
2. D. Neamen, D. Biswas "Semiconductor Physics and Devices," McGraw-Hill Education
3. S. M. Sze and K. N. Kwok, “Physics of Semiconductor Devices,” 3rd edition, John Wiley & Sons, 2006.
4. C.T. Sah, “Fundamentals of solid state electronics,” World Scientific Publishing Co. Inc,1991.
5. Y. Tsividis and M. Colin, “Operation and Modeling of the MOS Transistor,” Oxford Univ. Press, 2011.
6. Electronic Devices and Circuits, BOYLESTAD

Course Outcomes:

Students will be able to:

1. Construct different circuits using PN-Junction diode
2. Analyze working of transistor in different configurations
3. Operate MOSFET in Enhancement and Depletion Mode
4. Apply BJT & MOSFET for biasing and small signal models.
5. Analyze the fabrication process of Integrated circuits.

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

(F215A) DATA STRUCTURES

(Common to ECM, CSE & IT **)**

Course Objectives:

Students will learn to:

1. Define the basic data structures like linked list.
2. Understand the fundamentals and applications of linked list, stacks and queues.
3. Classify different types of tree data structures.
4. Understand the concepts of graph data structures.
5. Know the fundamentals of basic searching, sorting and pattern matching algorithms.

UNIT–I:

Basic concepts – Algorithm Specification, Data Abstraction, Performance analysis – time complexity and space complexity, Asymptotic Notation – Big O, Omega and Theta notations, Introduction to Linear and Non Linear data structures.

Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, circular linked list implementation, doubly linked list implementation, insertion, deletion and searching operations. Applications of linked lists.

UNIT–II:

Stacks-Operations, array and linked representations of stacks, stack applications-infix to postfix conversion, postfix expression evaluation, recursion implementation.

Queues-operations, array and linked representations. Circular Queue operations, Dequeue, applications of queue.

UNIT–III:

Trees – Terminology, Representation of Trees, Binary tree ADT, Properties of Binary Trees, Binary Tree Representations-array and linked representations, Binary Tree traversals, Threaded binary trees, Binary Heap-Properties, Max and Min Heap, Operations-Insertion and Deletion.

Search Trees – Binary Search tree, Tree traversals, AVL tree – operations, B-tree – operations, B+ trees, Red Black tree.

UNIT–IV:

Graphs – Terminology, sequential and linked representation, graph traversals: Depth First Search & Breadth First Search implementation. Spanning trees, Prims and Kruskals method.

Searching and Sorting– Linear Search, Binary Search, Insertion Sort, Selection Sort, Merge Sort, Quick sort, Heap Sort.

UNIT-V:

Hashing – Hash table, Hash table representations, hash functions, collision resolution techniques-separate chaining, open addressing-linear probing, quadratic probing, double hashing, Re hashing, Extendible hashing,

Pattern matching: Introduction, Brute force, the Boyer –Moore algorithm, Knuth-Morris-Pratt algorithm.

Text Books:

1. Data Structures Using C, Reema Thareja, Oxford University Press, 2011 Learning.
2. Introduction to Algorithms, TH Cormen, PHI

References:

1. Data Structures & Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education.
2. Design methods and analysis of Algorithms, SK Basu, PHI.
3. Fundamentals of Computer Algorithms, 2nd Edition, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Universities Press.

Course Outcomes:

Students will be able to:

1. Demonstrate operations like searching, insertion, deletion, traversing mechanism using linked list.
2. Use linear and non-linear data structures like stacks, queues etc.
3. Implement different types of tree data structures.
4. Implement the concepts of graph data structures.
5. Apply the basic searching, sorting and pattern matching Techniques.

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B. Tech. ECM	**L**	**T-P-D**	**C**
II Year - I Semester	**3**	**1-0-0**	**4**

(F217A) COMPUTER ORGANIZATION AND ARCHITECTURE

Course Objectives:

Students will learn to:

1. Understand basic components of computers.
2. Know the concepts of Computer arithmetic operations and about input output processor.
3. Understand about different I/O and how communicates with the processor.
4. Analyse different main memory structures and working of it.
5. Understand the parallelism both in terms of single and multiple processors including pipelining.

UNIT–I:

Basic Computer Organization

Functions of CPU, I/O units, Memory, Instructions: instruction formats- One Address, Two Addresses, Zero Addresses & Three Addresses & comparison.

Addressing modes with numeric examples: program control-status bit conditions, conditional branch instructions, Program interrupts: Types of interrupts.

UNIT–II:

Computer Arithmetic: Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating - point Arithmetic operations.

Input-Output Organization: Peripheral Devices, Input-Output Interface, Input –Output Processor (IOP), Intel 8089 IOP

UNIT–III:

Input-Output Organization

Input-Output Interface, I/O bus & modules, I/O Vs memory bus, Isolated Vs memory mapped I/O, Asynchronous data transfer Modes of Transfer-Strobe control. Handshaking; Asynchronous serial transfer- Asynchronous communication interface, Modes of transfer-Programmed I/O, Interrupt driven I/O, DMA, DMA controller, DMA transfer.

UNIT–IV:

Memory Organizations

Memory hierarchy, memories, RAM, ROM chips, Memory Address map, Memory connection to CPU, Associate memory, Cache memory.

data cache, instruction cache, miss & hit ratio, Access time, associative, set associative mapping, waiting into cache, introduction to virtual memory.

UNIT-V:

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Inter processor arbitration, Inter processor communication, and synchronization.

Text Books:

1. Computer Organization–Carl Hamacher, Zvonks Vranesic, Safea Zaky, Edition, McGrawHill.
2. Computer Systems Architecture–M.Moris Mano, IIIrd Edition, Pearson/PH

References:

1. Computer Organization and Architecture–WilliamStallingsSixthEdition, Pearson/PHI
2. Structured Computer Organization–AndrewS.Tanenbaum,4thEdition PHI/Pearson
3. Fundamentals or Computer Organization and Design, Sivaraama Dandamudi Springer Int. Edition.

Course Outcomes:

Students will be able to:

1. Understand the basic components and the design of CPU, ALU and Control Unit.
2. Analyse various arithmetic operations and Input –Output devices interfacing processor.
3. Knowing the functionality of different I/O devices and how they operate using synchronous and Asynchronous mode.
4. Understand how memory is organized to make computer operation fast and in effective way.
5. Understanding the concepts of Pipelining and advantages of Multi-processing systems.

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

(F214B) DIGITAL ELECTRONICS

Course Objectives:

Students will learn to:

1. Understand Boolean Algebra and simplify Boolean functions using K-Maps
2. Emphasize on the concepts of designing combinational circuits
3. Learn how to use memory elements in FSM designs
4. Know about different logic families like CMOS, TTL and ECL
5. Gain knowledge of different PLDs and RAM organization.

UNIT–I: Logic Simplification

Introduction to number system, Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms.

Canonical forms, Karnaugh maps up to 5 variables, Binary codes, Code Conversion.

UNIT–II: Combinational Logic Design

MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display.

Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU.

UNIT–III: Sequential Logic Design

Building blocks like S-R, D, T, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers.

Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits

UNIT–IV: Logic Families

TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL.

CMOS families and their interfacing, TTL logic family (7400, 74S00, 74LS00), ECL Logic family, comparison of logic families.

UNIT-V: Programmable logic Devices & Memories

Digital system design using ROM, PLA & PAL, comparison of ROM, PLA & PAL, RAM Memory, read and write operation timing diagram.

Memory Decoding, memory Cell, Address Multiplexing, Bipolar RAM, SRAM, DRAM, Memory organization, Internal Structure, RAM Matrix at transistor level and Gate level.

Text Books:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.

References:

1. W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition ,2006.
2. D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989
3. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition2012.

Course Outcomes:

Students will be able to:

1. Apply Boolean Algebra and K-Maps to minimize Boolean functions
2. Design different combinational circuits
3. Design different synchronous FSMs
4. Analyze different logic families and interfacing
5. Design digital systems using different PLDs

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B. Tech. ECM	**L**	**T-P-D**	**C**
II Year - I Semester	**3**	**1-0-0**	**4**

(F210A) MATHEMATICS – III

(Common to EEE, ECE, ECM **)**

Course Objectives:

Students will learn to:

1. Importance of Fourier series
2. Basic properties of complex functions and analytic functions
3. Taylor's series, Maclauren's and Laurent's series expansions of complex function
4. Evaluation of integrals using residue theorem.
5. The mapping by general analytic functions W=f(z) .

UNIT–I: FOURIER SERIES

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

UNIT–II: FUNCTIONS OF A COMPLEX VARIABLE

Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann conditions, Maxima – Minima principle, Harmonic and conjugate harmonic functions – Milne – Thompson method.

UNIT–III: COMPLEX INTEGRATION& POWER SERIES

Line integral – evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula
Generalized integral formula. Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series.

UNIT–IV: CONTOUR INTEGRATION

Singular point –Isolated singular point – pole of order m – essential singularity. (Distinction between the real analyticity and complex analyticity)

Residue – Evaluation of residue by formula and by Laurent series - Residue theorem, Evaluation of integrals of the type

(a) Improper real integrals $\int_{-\infty}^{\infty} f(x)dx$ (b) $\int_{c}^{c+2\pi} f(\cos\theta, \sin\theta)d\theta$

UNIT-V: CONFORMAL MAPPING

Transformation by e^z , Imz, z^2, z^n (n positive integer), Sin z, cos z, z + a/z. Translation, rotation, inversion and bilinear transformation – fixed point.

Cross ratio properties – invariance of circles and cross ratio – determination of bilinear transformation mapping 3 given points.

Text Books:

1. Grewal B.S, "Higher Engineering Mathematics", Khanna publications, 42nd edition 2012
2. Advanced Engineering Mathematics by Jain and S.R.K. Iyangar, Narosa Publications.
3. Engineering Mathematics by B.V.Ramana, Tata McGrawhill Publishing company Ltd New Delhi, 5th edition, 2011

References:

1. Engineering Mathematics-III by T.K.V. Iyengar & B.Krishna Gandhi & Others, S.Chand
2. Engineering Mathematics-III by G.Shankar Rao, I.K.International Publications.
3. KREYSZIG. E, "Advanced Engineering Mathematics" JohnWiley & Sons Singapore, 10th edition, 2012.
4. Veerarajan.T " Engineering Mathematics-I", Tata McGrawhill Publishing Co. NewDelhi, 5th edition, 2006.

Course Outcomes:

Students will be able to:

1. Find the series expansions of periodic functions
2. Construct the analytic function
3. Construct Laurent's series about the singular points
4. Use residue theorem to compute several kinds of real integrals
5. Construct conformal mappings between many kinds of domains

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

(F210E) PROFESSIONAL ETHICS

(Common to Civil, EEE, ME, ECE,CSE, IT, ECM)

Course Objectives:

Students will learn to:

This introductory course input is intended to help the students in understanding of ethics, values and holistic approach towards ethical living.

1. Learn ethical values and attitudes.
2. Understand the roles of a professional.
3. Understand the current scenario and engineer's responsibility towards the society
4. Know the types of professional ethical codes.
5. Learn the need for ethical audit.

UNIT–I:

Introduction to Ethics

Corporate Governance – importance of Corporate Governance, Ethics & CSR (Corporate Social Responsibility) Indian and western thoughts on ethics.

Value education, dimensions of ethics, goal setting importance of morality and ethics, basic ethical principles, moral developments theories, classification of ethical theories.

UNIT–II:

Professional and professionalism:

Introduction to profession, professional associations, professional's roles and professional risks. Professional accountability, successful professional, ethics and profession.

Engineering as social experimentation, engineering ethics, roles of engineers, professional responsibilities, professional rights. Professional etiquettes- Dress code, Telephone call, Email writing.

UNIT–III:

Ethical codes and audits

Introduction, need for ethical codes, sample codes, corporate codes, limitations of the codes.

Need for Ethical Audit, Sustainability, Ethical standards, Ethical audit.

UNIT–IV:

Human values and ethical living

Introduction, terminology, domains of learning, human values, attitudes, behavior values, attitudes and professionals.

Needs of life, harmony in life, what is ethical living, case studies.

UNIT-V:

Global issues and safety

Introduction, current scenario, business ethics, environmental ethics, computer ethics, media ethics, war ethics, bio-ethics, research ethics, intellectual property right.

Safety and risk, assessment of risk, risk and cost, engineers responsibility for safety, risk benefit, analysis, risk cause and management, case studies, providing for safe exit, ethical issues of safety

References:

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

Course Outcomes:

Students will be able to:

1. It ensures students in understanding essentials of human values and ethical living through basic ethical and moral theories.
2. Having awareness on professionalism, professional responsibilities, professional etiquettes.
3. It helps in understanding of ethical codes and audit.
4. Laying strong foundations in human values through domains of learning, ethical living through case studies.
5. Ability to develop various solutions in solving of global issues and for its safety and sustainability.

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

(F2141) ELECTRONIC DEVICES AND CIRCUITS LAB.

(Common to EEE, ECE, ECM **)**

Course Objectives:

Students will learn to:

1. Study the basic electronic components and Applications.
2. Observe the characteristics of different electronic devices.
3. Be familiar with rectifiers and filters
4. To observe the characteristics of transistors, SCR & UJT.
5. To analyze transistor amplifiers and their frequency responses.

Minimum Twelve experiments to be conducted

1. Forward & Reverse Bias Characteristics of a PN Junction Diode
2. Zener diode Characteristics and Zener diode as a voltage Regulator.
3. Input & Output Characteristics of Transistor in CB Configuration.
4. Input & Output Characteristics of Transistor in CE Configuration.
5. Half Wave Rectifier with & without filters
6. Full Wave Rectifier with & without filters
7. Bridge Rectifier with & without filters
8. FET characteristics
9. Measurement of h parameters of transistor in CE configuration
10. Frequency Response of CE Amplifier
11. Frequency Response of CC Amplifier
12. Frequency Response of Common Source FET amplifier
13. SCR characteristics
14. UJT Characteristics

Course Outcomes:

Students will be able to:

1. Measure the voltage, frequency and phase of any waveform using CRO.
2. Generate sine, square and triangular waveforms with required frequency and amplitude using function generator.
3. Analyze the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits like rectifiers, amplifiers, etc.,
4. Understand the concepts of SCR and observe its characteristics.
5. Understand the concepts of unipolar junction transistor and observe its characteristics.

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B. Tech. ECM	**L**	**T-P-D**	**C**
II Year - I Semester	**0**	**0-3-0**	**1.5**

(F2151) DATA STRUCTURES LAB.

(Common to CSE, IT, ECM **)**

Course Objectives:

Students will learn to:

1. Define the basic data structures like linked list.
2. Understand the fundamentals and applications of linked list, stacks and queues.
3. Classify different types of tree data structures
4. Understand the concepts of graph data structures.
5. Know the fundamentals of basic searching, sorting and pattern matching algorithms.

Experiment 1:

Write a C program that uses functions to perform the following operations on singly linked list: I) Creation II) Insertion III) Deletion IV) Traversal V) merge two single linked lists.

Experiment 2:

Write a C program that uses functions to perform the following operations on doubly linked list. I) Creation II) Insertion III) Deletion IV) Traversal

Experiment 3:

Write a C program that implement stack operations using: I) Arrays II) Linked Lists

Experiment 4:

I) Write a C program to convert infix expression to postfix expression using stack

II) Write a C program to evaluate postfix expression

Experiment 5:

I) Programs using recursion

II)Write a C program to convert infix expression to prefix expression using stack

Experiment 6:

Write a C program to implement Linear queue using I) Arrays II) Linked Lists

Experiment 7:

Write a C program to perform following operations on a circular Queue I) insertion II) deletion III) search and count.

Experiment 8:

Write a C program to perform following operations on a circular DeQueue I)insertion II) deletion III) search and count

Experiment 9:

I) Write a C Program to implement binary tree traversals

II) Write a C Program to implement AVL tree operations

Experiment 10:

I) Implementation of a Graph representation using Adjacency Matrix

II) Write a C program to implement graph traversals.

Experiment 11:

I)Write a C program to implement Linear search

II) Write a C program to implement Binary Search

Experiment 12:

Write C programs that implement the following sorting methods to sort a given list of integers in ascending order: I) Bubble sort II) Selection sort III) Insertion Sort

Experiment 13:

Write C programs that implement the following sorting methods to sort a given list of integers in ascending order: I) Merge sort II) Quick sort

Experiment 14:

I)Write a C Program to Implement the Hashing technique

II)Write a C Program to Implement the KMP Pattern Searching Algorithm

Text Books:

1. **C Programming & Data Structures**, B.A.Forouzan and R.F. Gilberg, ThirdEdition, Cengage Learning.
2. **Data Structures Using C** (Paperback) by Aaron M. Tenenbaum

References:

1. **C& Data structures** – P. Padmanabham, Third Edition, B.S. Publications.
2. **Data Structures using C** – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein,Pearson Education / PHI.
3. **C Programming & Data Structures**, E. Balagurusamy, TMH.

Course Outcomes:

Students will be able to:

1. Demonstrate operations like searching, insertion, deletion, traversing mechanism using linked list.
2. Use linear and non-linear data structures like stacks, queues etc.
3. Implement different types of tree data structures.
4. Implement the concepts of graph data structures.
5. Apply the basic searching, sorting and pattern matching Techniques.

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

(F2143) DIGITAL ELECTRONICS LAB.

(Common to ECE, ECM **)**

Course Objectives:

Students will learn to:

1. Verify the functionality of combinational circuits
2. Verify the functionality of combinational circuits
3. Analyze the RAM operations
4. Learn VHDL/Verilog simulation language
5. Verify the operations of the Digital IC's using VHDL/Verilog

List of Experiments:

To Verify the Functionality of the following 74 series TTL ICs.

1. D Flip -Flop (74LS74) and JK Master-Slave Flip-Flop (74 LS73}.
2. Decade counter (74LS90) and UP-Down Counter (74 LS192).
3. Universal Shift registers- 74LS194/ 195.
4. 3-8 decoder-74LS138.
5. 4-bit comparator 74LS 85.
6. 8X1 Multiplexer-74151 and 2X4 demultiplexer-74155.
7. RAM (16X4) - 74189 (read and write operations).
8. Stack and queue implementation using RAM, 74189.

Simulate the internal structure of the following Digital IC's using VHDL / VERILOG and verify the operations of the Digital IC's (Hardware) in the Laboratory

1. Logic Gates- 74XX.
2. Half Adder, Full Adder
3. 3-8 Decoders -74138.
4. 8 x 1 Multiplexer -74X151
5. 2x4 Demultiplexer-74X155
6. 4-bit Comparator-74X85.
7. D Flip-Flop 74X74.
8. Decade counter-74X90.

For Software Simulation

1. Computer Systems
2. LAN Connections (Optional)
3. Operating Systems
4. VHDL/ VERILOG
5. FPGAS/CPLDS (Download Tools)

Course Outcomes:

Students will be able to:

1. Design different combinational circuits using ICs
2. Analyze sequential circuits behaviour using ICs
3. Apply the design procedures to design basic sequential circuits
4. Learn about counters & Shift registers
5. Simulate combinational circuits using VHDL/Verilog

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

(F210C) GENDER SENSITIZATION

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

Course Objectives:

Students will learn to:

1. To develop students' sensibility with regard to issues of gender in contemporary India.
2. To provide a critical perspective on the socialization of men and women.
3. To introduce students to information about some key biological aspects of genders.
4. To expose the students to debates on the politics and economics of work.
5. To help students reflect critically on gender violence.

UNIT–I:

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

UNIT–II:

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

UNIT–III:

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

Text Books:

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

Course Outcomes:

Students will be able to:

1. Develop a better understanding of important issues related to gender in contemporary India.
2. Sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.

3. Acquire insight into the gendered division of labour and its relation to politics and economics.
4. Equipped to work and live together as equals.
5. Develop a sense of appreciation of women in all walks of life.

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B. Tech. ECM	**L**	**T-P-D**	**C**
II Year - II Semester	**3**	**1-0-0**	**4**

(F222C) CONTROL SYSTEMS

Course Objectives:

Students will learn to:

1. The different ways of system representations such as Transfer function representation.
2. State space representations and to assess the system dynamic response.
3. Assess the system performance using time domain analysis and methods for improving it
4. Stability of the systems by using different types of techniques.
5. Assess the system performance using frequency domain analysis and techniques for improving the performance.

UNIT–I: Mathematical Modelling of physical Control Systems-I

Basic elements of control system –Classification–Open and closed loop systems: Position Control Systems, Missile direction Control system,– Transfer function– Mathematical Modelling of Electrical, Mechanical, electro mechanical Systems and Thermal Systems.

UNIT–II: Mathematical Modelling of physical Control Systems-II

Mathematical modeling of Synchros – AC and DC servomotors– Block diagram Algebra– Signal flow graphs, Mason‘s gain Formula.

State variables–State variable representation of continuous time system–state equations– transfer function from state variable representation–Solutions of the state equations

UNIT–III: Time Domain Analysis of Control Systems

Introduction–Typical test signals–Step response analysis of second order systems– Transient response specifications– steady state error constants– Generalized error series– Effect of P, PI & PID Controllers.

UNIT–IV: Stability & Root Locus Techniques

Concept of BIBO stability-absolute stability–Routh-Hurwitz criterion –Root Loci theory– Application to systems stability studies–Illustration of the effect of addition of a zero and a pole.

UNIT-V: Frequency Domain Analysis & Design of Control Systems

Introduction– Polar plot –Nyquist stability criterion– Frequency domain indices (Gain margin, Phase margin and bandwidth) – Correlation between frequency and time response – Bode plot.

Need of Compensators–Design of lag and lead compensators using Bode plots–Applications

Text Books:

1. Control Systems Engineering', I.J. Nagrath and M. Gopal, New Age International Publishers, 2007.
2. Automatic Control systems, Pearson Education, Benjamin C. Kuo, New Delhi, 2003.

References:

1. K. Ogata, Modern Control Engineering', 4th edition, PHI, New Delhi, 2002.
2. Norman S. Nise, Control Systems Engineering, 4th Edition, John Wiley, New Delhi, 2007.
3. SamarajitGhosh, Control systems, Pearson Education, New Delhi, 2004

Course Outcomes:

Students will be able to:

1. Categorize different types of system and identify a set of algebraic equations to represent and model a complicated system into a more simplified form.
2. Characterize any system in Laplace domain to illustrate different specification of the system using transfer function concept.
3. Interpret different physical and mechanical systems in terms of electrical system to construct equivalent electrical models for analysis.
4. Employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions.
5. Identify the needs of different types of controllers and compensator to ascertain the required dynamic response from the system.

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

(F224E) ANALOG ELECTRONICS

Course Objectives:

Students will learn to:

1. Obtain ample knowledge in the analysis of single stage and multistage Amplifiers.
2. Understand the constructional features of JFET & MOSFET and to analyze as amplifiers using small signal model.
3. Gain the concept of feedback and to analyze the various feedback amplifiers.
4. Know the concept of oscillators and to design the various oscillators useful for various application.
5. Get ample knowledge in the analysis of large signal amplifiers and tuned amplifiers.

UNIT–I: ANALYSIS AND DESIGN OF SMALL SIGNAL BJT AMPLIFIERS

Analysis of CE, CC, and CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors, Design of single stage RC coupled amplifier Different coupling schemes used in amplifiers, Analysis of Cascaded RC Coupled amplifiers, Cascode amplifier, Darlington pair, Frequency response of BJT amplifier.

The Hybrid- pi Common Emitter transistor model, CE short circuit current gain, current gain with resistive load, single stage CE transistor amplifier response, Gain-bandwidth product.

UNIT–II: FET AMPLIFIERS

Comparison of performance with BJT Amplifiers, Basic Concepts of MOS Amplifiers, and MOSFET Characteristics in Enhancement and Depletion mode – MOS Small signal model, Common source amplifier with resistive load, Source follower-frequency response.

UNIT–III: NEGATIVE FEEDBACK IN AMPLIFIERS

Classification of amplifiers, Concepts of feedback – Classification of feedback amplifiers – General characteristics of negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems

UNIT–IV: POSITIVE FEEDBACK IN AMPLIFIERS

Condition for oscillations, RC and LC type Oscillators – Frequency and amplitude stability of oscillators – Generalized analysis of LC oscillators, Quartz, Hartley, and Colpitts Oscillators – RC-phase shift and Wien-bridge oscillators.

UNIT-V: LARGE SIGNAL AMPLIFIERS

Class A Power Amplifier, Maximum Value of Efficiency of Class – A Amplifier, Transformer Coupled Amplifier, Push Pull and Complimentary Symmetry Class B and Class AB Power Amplifiers – Principle of operation of class –C Amplifier, Transistor Power Dissipation, Heat Sinks, Introduction to Tuned Amplifiers, Q-Factor, Small Signal Tuned Amplifiers.

Text Books:

1. Electronic Devices and Circuits, David A. Bell – 5th Editions, Oxford.
2. Electronic Devices and Circuits – 2nd Edition by Muhammad H.Rashid, Cengage Learning

References:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, TMH
2. Integrated Electronics, Jacob Millman, Christos C Halkias, TMH
3. Introductory Electronic Devices and Circuits (Conventional flow version) – Robert T. Paynter, 7th Edition, 2009, PEI.
4. Microelectronic Circuits – Sedra / Smith – 5th Edition – Oxford, 2009
5. Electronic Circuit Analysis – K. Lal Kishore, BS Publications, 2004.
6. Electronic Devices and Circuits, Anil.K. Maini, Varsha Agrawal, 1st Edition, WILEY.
7. Electronic Devices and Circuit Theory, Robert L.Boylestad, Louis Nashelsky, 9th Edition, Pearson Education.

Course Outcomes:

Students will be able to:

1. Analyze the single stage and multistage amplifiers.
2. Analyze the JFET & MOSFET amplifiers using small signal model.
3. Demonstrate the concept of feedback amplifiers.
4. Illustrate various types of oscillators.
5. Interpret large signal amplifiers and tuned amplifiers.

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

(F225A) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

(Common to ECM, CSE, IT **)**

Course Objectives:

Students will learn to:

1. Familiar with constructors and string handling functions
2. Explain inheritance and polymorphism
3. Familiar with packages and interfaces
4. Familiar with exception handling and multithreading
5. Familiar with applet programming, event handling and scripting.

UNIT–I:

Introduction: OOP concepts, history of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program.

Classes and Objects: Concepts of classes, objects, constructors, methods, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion. String handling: String, String Buffer, String Tokenizer.

UNIT–II:

Inheritance: Base class object, subclass, member access rules, super uses, using final with inheritance, method overriding, abstract classes

Interfaces: defining an interface, implementing interface, differences between classes and Interfaces and extending interfaces.

Packages: Defining, creating and accessing a package, importing packages, access control, exploring package - java.io

UNIT–III:

Exception handling: Concepts of exception handling, benefits of exception handling, exception hierarchy, checked and unchecked exceptions, usage of-try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.

Multithreading: Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

Unit–IV:

Applets: Concepts of applets, differences between applets and applications, life cycle of applet, types of applets, creating applets, passing parameters to applets.

Event handling: Events, event sources, event classes, event listeners, delegation event model, handling mouse and key board events, adapter classes. The awt class hierarchy, user interface components-labels, buttons, canvas, scrollbars, text components, checkbox, checkbox groups, choices, lists.

Unit-V:

Layout manager: Layout manager types-border, grid, flow, card and grid bag.
Swing: introduction, limitations of awt, components, containers,
Exploring swing– **J**applet, jframe and jcomponent, icons and labels, text fields, buttons – the jbutton class, checkboxes, radio buttons, combo boxes, tabbed panes, scroll panes, trees and tables.

Text Books:

1. Java The complete reference, 8th edition, Herbert Schildt, TMH.
2. Understanding OOP with Java, updated edition, T.Budd, Pearson education.

References:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons.
2. An Introduction to OOP, second edition, T. Budd, pearson education.
3. Introduction to Java programming 6th edition, Y. Daniel Liang, pearson education.

Course Outcomes:

Students will be able to:

1. Familiar with constructors and string handling.
2. Understand inheritance and polymorphism.
3. Understand packages and interfaces.
4. Understand exception handling and multithreading.
5. Understand applet programming.

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

(F220B) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Common to ME, ECE,CSE &ECM **)**

Course Objectives:

Students will learn to:

This course is intended to familiarize the students with the basics of managements concepts, production and cost analysis concepts, trends in economic environment and financial accounting topics.

UNIT–I:

Introduction to Managerial Economics & Demand Analysis:

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

Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

UNIT–II:

Production & Cost Analysis:

Production Function - Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

UNIT–III:

Types of Markets & Economic Environment:

Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.

Pricing - Objectives and Policies of Pricing. Methods of Pricing.

Trends in economic Environment: Inflation, GDP, Introduction to GST, Interest rates.

UNIT–IV:

Introduction to Financial Accounting

Accounting concepts and Conventions - Introduction IFRS - Double - Entry Book Keeping, Journal, Ledger and Trial Balance.

Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments)

UNIT-V:

FINANCIAL ANALYSIS

Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios.

Du Pont Chart analysis. Theoretical concepts of funds flow statements.

References:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2014.
2. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age international Publishers, Hyderabad 2014.
3. M. Kasi Reddy & Saraswathi, Managerial Economics and Financial Analysis, PHI New Delhi, 2014.
4. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi, 2012.
5. H. Craig Peterson & W. Cris Lewis, Managerial Economics, Pearson, 2012.
6. Lipsey & Chrystel, Economics, Oxford University Press, 2012.

Course Outcomes:

Students will be able to:

1. Understand the Importance of Micro Economics and demand analysis concepts in detail.
2. Get an idea about the production concepts and analysis of various types of costs.
3. Apply the various pricing strategies and understanding of competitive markets.
4. Application of fundamental concepts of financial accounting.
5. Analyse & interpretation of financial ratios for more financial accuracy.

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

(F220E) ENVIRONMENTAL SCIENCE

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

Course Objectives:

Students will learn to:

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

UNIT–I:

Ecosystems & Natural Resources, **Biodiversity:** Concept, Classification of Resources: Water resources, Land resources, land degradation, Forest resources, Mineral resources, Energy resources.

Concept of ecosystem, Classification of ecosystem, Functions of ecosystem. Biodiversity, Level, values, hotspots of biodiversity, Threats To Biodiversity, Conservation Of Biodiversity.

UNIT–II:

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

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

UNIT–III:

Environmental Policy, Legislation, Rules and Regulations: Environmental Protection Act: Air (Prevention and control of pollution) Act-1981, Water (Prevention and control of pollution) Act-1974, Forest Conservation Act.

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

Text Books:

1. TEXT BOOK OF ENVIRONMENTAL Science and Technology by M.Anji Reddy 2007
2. Principles of Environmental Science and Engineering by P.Venugopal Rao.
3. Introduction to Environmental Studies by K.Mukkanti
4. Text book of Environmental studies by Kaushik & Anubha kaushik

References:

1. Tata McGraw-Hill: Introduction to Environmental Studies by Benny Joseph
2. Environmental Studies by Erach Bharucha 2005, University Grants Commission, University Press.

Course Outcomes:

Students will be able to:

1. Identify the importance of natural resources and use them efficiently.
2. support and conserve the biodiversity.
3. Apply environmental plan in developing any sort of environmental projects
4. solve the sources and risks caused by pollution.
5. apply the environmental legislation in every walk of life and importance of sustainability

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

(F220D) BIOLOGICAL SCIENCES

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

Course Objectives:

Students will learn to:

1. To study the basis of biology
2. To know the process of inheritance & evolution
3. Gain knowledge of human systems
4. Understand the basic concept of nutrients
5. Know about different microorganisms

UNIT–I:

Basic Biology: Introduction, Living organisms.

Functions of cell organelles: Cell structure and Organelles, Organogenesis.

UNIT–II:

Human Anatomy: Systems of Life-Digestion, Respiration, Circulatory systems. Excretion, Reproduction, and Nervous systems.

UNIT–III:

Biochemistry: Diet and Nutrition- Macro (Carbohydrates, proteins, lipids) - and Micronutrients (vitamins).

Minerals: Essential minerals and their role; deficiency symptoms; and their role; deficiency symptoms.

UNIT–IV:

Microbiology: Microorganisms-Classification of Microorganisms.

Advantages and disadvantages of microorganisms: Beneficial and harmful effects of Bacteria, Fungi and Viruses

UNIT-V:

Genetics: Basic principles of Mendel, molecular genetics, structure and function of genes and chromosomes.

Gene expressions: Transcription and Translation, gene expression and regulation.

Text Books:

1. P K Gupta," Elements of Biotechnology", RASTOGI Publications
2. Dr RC Dubey ,"Advanced Biotechnology", S Chand Publications.

References:

1. Cell biology",Rastogi Publications
2. Microbiology,PELCZAR
3. Biotechnology,U.sathyanarayana

Course Outcomes:

Students will be able to:

1. Acquire the Knowledge of basic biology
2. Acquire the Knowledge of Human Biological Systems
3. Acquire the knowledge of Nutrients
4. Acquire Knowledge on Microorganisms
5. Acquire the knowledge gene expression

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B. Tech. ECM	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-4-0**	**2**

(F2251) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB.

(Common to CSE, IT, ECM **)**

Course Objectives:

Students will learn to:

1. Write java programs using arithmetic operators, control statements, type conversion, constructors and string handling
2. Explain how to write java programs using inheritance and polymorphism
3. Explain how to write java programs for creation of user defined packages and interfaces
4. Familiar with exception handling, multithreading and event handling
5. Explain how to write java programs using applets.

EXPERIMENT 1:

Write java programs that implement the following

a) Constructor b) Parameterized constructor c) Method overloading d) Constructor overloading.

EXPERIMENT 2:

a) Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.
b) Write a Java program for sorting a given list of names in ascending order.
c) Write a Java Program that reads a line of integers, and then displays each integer and the sum of all the integers (Use String Tokenizer class of java.util

EXPERIMENT 3:

Write java programs that uses the following keywords

a) This c) super
b) static d) final

EXPERIMENT 4:

a) Write a java program to implement method overriding
b) Write a java program to implement dynamic method dispatch.
c) Write a Java program to implement multiple inheritance.
d) Write a java program that uses access specifiers

EXPERIMENT 6:

a) Write a Java program for handling Checked Exceptions.
b) Write a Java program for handling Unchecked Exceptions

EXPERIMENT 7:

a) Write a Java program that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.
b) Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication

EXPERIMENT 8:

a) Develop an applet that displays a simple message.
b) Develop an applet that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named "Compute" is clicked

EXPERIMENT 9:

Write a Java program that works as a simple calculator. Use a grid layout to arrange button for the digits and for the +, -,*, % operations. Add a text field to display the result

EXPERIMENT 10:

a) Write a Java program for handling mouse events.
b) Write a Java program for handling key events.

EXPERIMENT 11:

a) Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields Num1 and Num 2.

The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1or Num2 were not an integer, the program would throw Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception and display the exception in a message dialog box.

EXPERIMENT 12:

a) Write a java program that simulates traffic light. The program lets the user select one of three lights: red, yellow or green. When a radio button is selected, the light is turned on, and only one light can be on at a time No l Light is on when the program starts.
b) Write a Java program that allows the user to draw lines, rectangles and ovals

Text Books:

1. Java:the complete reference,8th editon ,Herbert Schildt, TMH.
2. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI.
3. Introduction to Java programming, Sixth edition, Y.Daniel Liang, Pearson Education.
4. Big Java, 2nd edition, Cay Horstmann, Wiley Student Edition, Wiley India Private Limited

Course Outcomes:

Students will be able to:

1. Write java programs using arithmetic operators, control statements, type
2. conversion, constructors and string handling
3. Write java programs for inheritance and polymorphism
4. Write java programs for creation of user defined packages and interfaces
5. Write java programs for exception handling and multithreading.
6. Write java programs for creation of applets.

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B. Tech. ECM	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-3-0**	**1.5**

(F2241) ANALOG ELECTRONICS LAB.

(Common to ECM**)**

Course Objectives:

Students will learn to:

1. Understand the amplifier operation at low and high frequency and its frequency responses.
2. Design transistor CE and CC amplifier.
3. Learn about different types of feedback amplifiers and oscillators
4. Generalize the power amplifiers.
5. To design single Tuned voltage amplifier

List of the Experiments:

1. Common Emitter Amplifier
2. Common Collector Amplifier
3. Two Stage RC Coupled Amplifier
4. Common Source amplifier
5. Current Shunt and Voltage Series Feedback Amplifier
6. RC Phase Shift Oscillator using Transistors
7. Wien Bridge Oscillator using Transistors
8. Hartley Oscillator
9. Colpitt's Oscillator
10. Class A Power Amplifier (Transformer less)
11. Class B Complementary Symmetry Amplifier
12. Single Tuned Voltage Amplifier

Equipment required for Laboratories:

a) RPS
b) CRO
c) Function Generators
d) Multimeters
e) Components

Course Outcomes:

Students will be able to:

1. Identify the classification of amplifiers and analyze the CE & CC amplifiers.
2. Design and analyze Common Source amplifier.
3. Design and analyze Two stage RC coupled amplifier.
4. Understand Class A power amplifier.
5. Design and analyze single Tuned voltage amplifier.

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

(F317A) PULSE AND DIGITAL CIRCUITS

Course Objectives:
Students will learn to:

1. Explain the complete response of R-C and R-L- C circuits and clippers, clampers.
2. Construct various multi vibrators using transistors.
3. Analyze Time Base generators.
4. Familiarize with Design of Sweep Circuits.
5. Discuss and realize logic gates using diodes and transistors

UNIT–I:

Linear Wave Shaping: High pass and low pass RC circuits and their response for Sinusoidal, Step, Pulse, Square, & Ramp inputs, High pass RC network as Differentiator, Low pass RC circuit as an Integrator, Attenuators and its application as a CRO Probe, RL and RLC Circuits and their response for Step Input, Ringing Circuit.

Non-Linear Wave Shaping: Diode clippers, Transistor clippers, clipping at two independent levels, Clamping Operation, clamping circuit taking Source and Diode resistances into account, Clamping Circuit Theorem, Practical Clamping Circuits, Effect of diode characteristics on clamping voltage.

UNIT–II:

Switching Characteristics of Devices: Diode as a Switch, Piecewise Linear Diode Characteristics, Diode Switching times, Transistor as a Switch, break down voltages, Transistor in Saturation, Transistor-switching times.
Multivibrators: Analysis and Design of Bitable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors.

UNIT–III:

Time Base Generators: General features of a Time base Signal, Methods of Generating Time Base Waveform, Miller and Bootstrap Time base Generators-Basic Principles, Transistor Miller Time Base generator, UJT as relaxation oscillator, Transistor Bootstrap Time Base Generator, Transistor Current Time Base Generators, Methods of Linearity improvement.

UNIT–IV:

Synchronization and Frequency Division: Pulse Synchronization of Relaxation Devices, Frequency division in Sweep Circuit, Stability of Relaxation Devices, Astable Relaxation Circuits, Monostable Relaxation Circuits, Synchronization of a Sweep Circuit with Symmetrical Signals, Sine wave frequency division with a Sweep Circuit, A Sinusoidal Divider using Regeneration and Modulation.

UNIT-V:

Sampling Gates: Basic operating principles of Sampling Gates, Unidirectional and Bi-directional Sampling Gates, Four Diode Sampling Gate, Reduction of pedestal in Gate Circuits, Six Diode Gate, Application of Sampling Gates.

Realization of Logic Gates Using Diodes & Transistors: AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL and CML Logic Families and its Comparison.

Text Books:

1. Millman‟s Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S.Prakash Rao, 2 ed., 2008, TMH.
2. Solid State Pulse circuits –David A. Bell, 4 ed., 2002 PHI.

References:

1. Pulse and Digital Circuits – A. Anand Kumar, 2005, PHI.
2. Fundamentals of Pulse and Digital Circuits- Ronald J. Tocci, 3 ed., 2008.
3. Pulse and Digital Circuits – Motheki S. Prakash Rao, 2006, TMH. 4.Wave Generation and Shaping - L. Straus

Course Outcomes:

Students will be able to:

1. Demonstrate the applications of diode as integrator, differentiator, clippers, and clamper circuits.
2. Design multivibrators for various applications,
3. Elongate Time Base generators.
4. Differentiate synchronization techniques and sweep circuits.
5. Analyze logic gates using diodes and transistors.

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

(F317B) DATABASE MANAGEMENT SYSTEMS

Course Objectives:

Students will learn to:

1. Understand the architecture and functioning of database management systems as well as associated tools and techniques.
2. Understand and apply the principles of data modeling using entity relationship and develop a good database design.
3. Understand the use of structured query language (SQL) and its syntax.
4. Apply normalization techniques to normalize a database.
5. Understand the need of database processing and learn techniques for controlling the consequences of concurrent data access.

UNIT–I:

Data base Systems- Database System Applications, data base System VS file System – View of Data – Data Abstraction –Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor

ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model

UNIT–II:

Introduction to the Relational Model

Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views.

Relational Algebra

Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

UNIT–III:

Form of Basic SQL Query

Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

Schema refinement

Problems Caused by redundancy – Decompositions – Problem related to decomposition –

reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.

UNIT–IV:

Transaction Concept

Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability– Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity.

Recovery and Atomicity

Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile Storage-Advance Recovery systems- Remote Backup systems.

UNIT-V:

Data on External Storage

File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.

Advanced Database Management System

Introduction to Distributed Database-Reference Architecture, fragmentation, Allocation, Joins

Text Books:

1. **DataBase Management Systems**, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
2. **Database System Concepts**, Silberschatz, Korth, McGraw hill, V edition.

References:

1. **Database Systems design,** Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. **Fundamentals of Database Systems,** Elmasri Navrate Pearson Education
3. **Introduction to Database Systems,** C.J.Date Pearson Education

Course Outcomes:

Students will be able to:

1. Describe basic concepts of database system.
2. Design a data model and schemas in RDBMS.
3. Use RDBMS for developing industry applications.
4. Be competent in use of structured query language Sql.
5. Analyze functional dependencies for designing a robust database

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B. Tech. ECM	**L**	**T-P-D**	**C**
III Year - I Semester	**2**	**1-0-0**	**3**

(F317C) OPERATING SYSTEMS

Course objectives:

Students will learn to:

1. Know the different types of Operating Systems and learn in detail about process management.
2. Understand the concept of Critical Section Problem and memory management.
3. Understand principles of deadlock and the concepts of file system interface.
4. Understand various file system and directory structures implementation.
5. Understand Protection and security aspects of operating systems.

UNIT–I: Operating System Overview:

Overview of Computer Operating Systems, Operating System Functions, Protection and Security, Distributed Systems, Special Purpose Systems, Operating System Structures, Operating System Services and Systems Calls, Operating Systems Generation.

Process Management:

Process Concepts, Threads, Scheduling-Criteria, Algorithms Evaluation, Thread Scheduling.

UNIT–II: Concurrency:

Process Synchronization, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples, Atomic Transactions.

Memory Management:

Swapping, Contiguous Memory Allocation, Paging, Page-Table Structure, Segmentation, Virtual Memory, Demand Paging, Page-Replacement Algorithms, Frames Allocation, Thrashing.

UNIT–III: Principles of Deadlock:

System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

File System:

File System Interface, File Concepts, Access Methods and Directory Structure, File System Mounting, File Sharing and Protection.

UNIT–IV: File System Implementation:

File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance. Case Studies: UNIX, Linux and Windows.

Mass Storage Overview:

Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Swap-Space Management, RAID Structure, Stable-Storage Implementation, Tertiary Storage Structure.

UNIT-V: Protection & Security:

Goals of Protection, Principles of Protection, Domain of Protection Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems, Language-Based Protection. Security Problem, Program Threats, System and Network Threats Cryptography as a Security Tool, User Authentication, Implementing Security Defences, firewalling to protect Systems and Networks, Computer-Security Classifications, Case Studies: UNIX, Linux and Windows.

Advanced Operating Systems:

Distributed Operating Systems, Multi-Processor Operating Systems, Real-Time Operating Systems and Mobile Operating Systems.

Text Books:

1. **Operating System Concepts-Abraham Silberchatz**, Peter B. Galvin, Greg Gagne, 7th Edition, John Wiley.
2. **Operating Systems- A Concept based Approach**-D.M.Dhamdhere, 2nd Edition, TMH.

References:

1. **Principles of Operating Systems-Naresh Chauhan,** Oxford Higher Education.
2. **Operating System, A Design Approach**-Crowley, TMH.
3. **Modern Operating Systems**-Andrew S Tanenbaum, 2nd Edition Pearson, PHI.

Course outcomes:

Students will be able to:

1. Contrast and compare different types of operating systems including process management.
2. Apply different CPU scheduling algorithms and various Memory management techniques.
3. Illustrate the use of Bankers algorithm for deadlock avoidance and File system organization.
4. Demonstrate various file structures and directory structures in mass storage management.
5. Analyze different aspects of protection and security concepts.

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III Year - I Semester	**3**	**0-0-0**	**3**

(F317D) DESIGN AND ANALYSIS OF ALGORITHMS

Course objectives:

Students will learn to:

1. Know about on time and space complexity and learning asymptotic notations
2. Understand union and find algorithms, connected components and bi-connected components.
3. Gain knowledge in divide and conquer methods
4. Familiar with greedy method and dynamic programming
5. Understand the back tracking and can application

UNIT–I:

Introduction

Algorithm, Pseudo Code for expressing Algorithms, Performance Analysis: Space Complexity, Time Complexity, asymptotic Notations: Big-oh Notation, Omega Notation, Theta Notation, Little-oh Notation.

Disjoint Sets: Disjoint Set Operations, Union and Find Algorithms, Spanning Trees, Connected Components and Biconnected Components.

UNIT–II:

Divide and Conquer

General Method, Applications: Binary Search, Quick Sort, Merge Sort, Stassen's Matrix Multiplication.

Greedy Method

General Method Applications: Job Sequencing with Deadlines, 0/1 Knapsack Problem, Minimum Cost Spanning Trees: Prim's and Kruskal's Algorithms, Single Source Shortest Path Problem, Huffman Codes.

UNIT–III:

Dynamic Programming

General Method, Principle of Optimality, Applications: Multistage Graphs, Matrix Chain Multiplication, Optimal Binary Search Trees, 0/1 Knapsack Problem.

All Pairs Shortest Path Problem, Travelling Sales Person Problem, Reliability Design.

UNIT–IV:

Backtracking

General Method, Applications: N queen Problem, Recursive Permutation Generator, Sum of Subsets Problem, Graph Coloring, Hamiltonian Cycles.

UNIT-V:

Branch and Bound

General Method, Applications: Travelling Sales Person Problem, 0/1 Knapsack Problem, LC Branch and Bound Solution, FIFO Branch and Bound Solution.

NP-Hard and NP-Complete Problems: Basic Concepts, Non-Deterministic Algorithms, NP-Hard and NP-Complete Classes, Cook's Theorem.

Text Books:

1. Fundamentals of Computer Algorithms-Ellis Horowitz, Satraj Sahni and Rajasekharam, Galgotia Publications Pvt. Ltd.
2. Introduction to Algorithms-T.H.Cormen, C.E.Leiserso, R.L.Rivest and C.Stein, 2nd Edition, Pearson Education, PHI Pvt. Ltd.

References:

1. Algorithm Design: Foundations, Analysis and Internet Examples-M.T.Goodrich and R.Tomassia, John Wiley and Sons.
2. Introduction to Design and Analysis of Algorithms A strategic Approach-R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc-Graw Hill.
3. Design and analysis of Algorithms-S. Sridhar, Oxford Higher Education.

Course outcomes:

Students will be able to:

1. Gain knowledge on time complexity and space complexity and learn asymptotic notations such as big oh, omega, and theta notations.
2. Understand union and find algorithms, connected components and bi-connected components.
3. Master divide and conquer method and can apply this to solve some sorting and searching problems.
4. Be familiar with greedy method and dynamic programming can apply these to solve verity of problems.
5. Gain knowledge on back tracking and can apply this to solve n-queens problem, sum of subsets problem, graph coloring problem and Hamiltonian cycles problems.

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III Year - I Semester	**3**	**0-0-0**	**3**

(F310A) MANAGEMENT SCIENCE

(Common to all)

Course Objectives

Students will learn to:

This course is intended to familiarize the students with the framework for the managers and leaders in understanding and making decisions related to planning & organizational structure, Operations management, Marketing management, Human resource Management.

UNIT–I:

Introduction to Business & Management

Types of Business – Sole proprietorship, partnership, Joint stock company, public enterprises and their types, Changing Economic environment, LPG. Nature and Importance of Management, Functions of Management.

Taylor's Scientific Management Theory, Fayol's Principles of Management, Douglas McGregor's Theory X and Theory Y, Systems Approach to Management. 7's frame work, Contingency theory.

UNIT–II:

Planning & Organizational Structures

Types of planning, nature of planning, levels of planning, planning process, Vision, mission, Objectives of organization. Departmentation, Decentralization, Centralization and Recentralization.

Types of Organization structures - Line organization, Line and staff organization, functional organization, Committee organization, Matrix organization, Cellular Organization, Virtual Organization, Team structure, lean and flat organization structure and their merits, demerits and suitability.

UNIT–III:

Operations Management & Project Management

Types of Plant Layout-Methods of production Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement-Statistical Quality Control: $\overline{X}$ chart, R chart, c chart, p chart, Quality, Deming principles

EOQ, ABC Analysis, VED Analysis. TQM, JIT, BPR, Six Sigma. Project management (PERT/CPM): Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), identifying critical path.

UNIT–IV:

Human Resources Management

Concepts of HRM, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Promotion, Performance Appraisal, Grievance Handling and Welfare Administration.

Job Evaluation and Merit Rating, Bench marking (Human Resource) Compensation. Leadership & Motivation- Leadership styles, Motivation- Maslow's Theory, ERG theory, Herzberg's Two factor theory, Groups & Teams.

UNIT-V:

Marketing Management

Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, New product development, Services marketing, Characteristics of services, Services Mix.

Channels of distribution, Retailing and Basics of Rural Marketing, Digital Marketing, Virtual Marketing, Logistics & Supply chain management.

References:

1. Principles of Management by James A.F. Stoner, **Publisher:** Pearson Education; Second edition (2010)
2. Kotler Philip & Keller Kevin Lane: Marketing Management, **Publisher:** Pearson; 15 edition (15 September 2015)
3. Production and Operations Management, **Publisher:** PHI; 3 edition (6 February 2012) R. Panneerselvam (Author)
4. L.S.Srinath: PERT/CPM,Affiliated East-West Press, 2009.
5. William J. Stevenson & Ceyhun Ozgur: Introduction to Management Science, TMH, 2007.
6. Rao, P. Subba. *Essentials of Human Resource Management and Industrial Relations: Text, Cases and Games*. Himalaya Publishing House, 2010.
7. Ramaswamy Namakumari: Marketing Management. **Publisher:** McGraw-Hill India; 5 edition (2013)

Course Outcomes:

Students will be able to:

1. Evolve a strategy for a business or service organization.
2. Planning and types of organizational structures for a given context.
3. Carry out production operations through Work study and SQC.
4. Understand the Human resource concepts in detail.
5. Analyze markets, competition and pricing strategies, Basics of rural marketing, virtual, marketing, Logistics & Digital marketing.

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III Year - I Semester	**0**	**0-4-0**	**2**

(F3171) PULSE AND DIGITAL CIRCUITS LAB.

Course Objectives:

Students will learn to:

1. Learn the complete response of R-C and R-L-C transient circuits.
2. Explain clippers, clampers, switching characteristics of transistors and sampling gates.
3. Design various multivibrators using transistors, design of sweep circuits and sampling gates.
4. Discuss and realize logic gates using diodes and transistors.
5. Design and analyse of UJT Relaxation Oscillator and Bootstrap Sweep Circuit.

Minimum Twelve experiments to be conducted:

1. Linear wave shaping.
2. Non Linear wave shaping – Clippers.
3. Non Linear wave shaping – Clampers.
4. Transistor as a switch.
5. Study of Logic Gates & some applications.
6. Study of Flip-Flops & some applications.
7. Sampling Gates.
8. Astable Multivibrator.
9. Monostable Multivibrator.
10. Bistable Multivibrator.
11. Schmitt Trigger.
12. UJT Relaxation Oscillator.
13. Bootstrap Sweep Circuit.

Equipment required for Laboratories:

1. Regulated Power Supply- 0 – 30V
2. CRO- 0 – 20 M Hz.
3. Function Generators- 0 – 1 M Hz
4. Components
5. Multi Meters

Course Outcomes:

Students will be able to:

1. Understand the applications of diode as integrator, differentiator, clippers, clamper circuits.
2. Demonstrate the Difference between logic gates and sampling gates.
3. Design and analyse various multivibrator circuits
4. Design and analyse Schmitt Trigger.
5. Design and analyse UJT Relaxation Oscillator and Bootstrap Sweep Circuit.

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

(F3172) DATABASE MANAGEMENT SYSTEMS LAB.

Course Objectives:

Students will learn to:

1. Introduce ER data model, database design and normalization
2. Learn SQL basics for data definition and data manipulation
3. Know the steps in the development of Databases
4. Compare relational model with the Structured Query Language (SQL)
5. Identify the various functions of Database Administrator

LIST OF EXPERIMENTS:

1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition.

REFERENCES BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Introduction to Database Systems, C.J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S. Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

Course Outcomes:

Students will be able to:

1. Design database schema for a given application and apply normalization
2. Acquire skills in using SQL commands for data definition and data manipulation.
3. Develop solutions for database applications using procedures, cursors and triggers
4. Use commercial relational database system (Oracle) by writing Queries using SQL.
5. Work successfully on a team by design and development of a database application system as part of a team.

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

(F3173) OPERATING SYSTEMS LAB.

Course objectives:

Students will learn to:

1. Describe CPU scheduling algorithms.
2. Understand the file allocation and file organization strategies.
3. Understand banker's algorithm for deadlock prevention and avoidance.
4. Explain various memory management and page replacement algorithms.
5. Discuss paging and allocation of frames.

Experiment 1: Simulate the following CPU scheduling algorithms

a) FCFS

b) SJF

Experiment 2: Simulate the following CPU Scheduling algorithms

a) Round Robin

b) Priority

Experiment 3: Simulate all file allocation strategies

a) Sequential

b) Linked

c) Indexed

Experiment 4: Simulate MVT and MFT

Experiment 5: Simulate the following File Organization Techniques

a) Single level directory

b) Two level directory

Experiment 6: Simulate the Hierarchical File Organization Technique

Experiment 7: Simulate the following Disk scheduling algorithms

a) FCFS

b) SSTF

c) SCAN

d) C-SCAN

Experiment 8: Simulate Bankers Algorithm for Dead Lock Avoidance**.**

Experiment 9: Simulate Bankers Algorithm for Dead Lock Prevention.

Experiment 10: Simulate all page replacement algorithms

a) FIFO

b) LRU

c) LFU

Experiment 11: Simulate Paging Technique of memory management.

Experiment 12: Simulate on Allocation of Frames

REFERENCE BOOKS:

1. Operating System Concepts-Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 7th Edition, John Wiley.
2. Operating Systems- A Concept based Approach- D.M.Dhamdhere, 2nd Edition, TMH.
3. Principles of Operating Systems- Naresh Chauhan, Oxford Higher Education.
4. Operating System, A Design Approach-Crowley, TMH.
5. Modern Operating Systems-Andrew S Tanenbaum, 2nd Edition Pearson, PHI.

Course outcomes:

Students will be able to:

1. Apply different CPU scheduling algorithms.
2. Implement different directory structures.
3. Analyze deadlock prevention and avoidance algorithms.
4. Demonstrate various page replacement algorithms.
5. Practice various disk scheduling algorithms.

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B. Tech. ECM	**L**	**T-P-D**	**C**
III Year - II Semester	**2**	**1-0-0**	**3**

(F327A) COMPILER DESIGN

Course Objectives:

Students will learn to:

1. Illustrate different phases of compilation.
2. Describe the steps and algorithms used by language translators and features.
3. Enumerate top down and bottom up parsing techniques used in compilation process.
4. Introduce the syntax directed translation and type checking and learning the effectiveness of optimization.
5. Develop algorithms to generate code for a target machine.

UNIT–I:

Formal Language and Regular Expressions: Languages, Definition Language regular expressions, Finite Automata-DFA, NFA.

Conversions: Conversion of regular expression to NFA, NFA to DFA, Applications of Finite Automata to lexical analysis-lex tools.

UNIT–II:

Context Free grammars and parsing: Context free grammars, derivation, parse trees, ambiguity LL (K) Grammars and LL (1) parsing.

Bottom up parsers: Bottom up parsing handle pruning LR Grammar Parsing, LALR Parsing, Parsing ambiguous grammars, YACC Programming specification.

UNIT–III:

Semantics: Syntax directed translation, S-attributed and L-attributed grammars, and Intermediate code-abstract, syntax tree, translation of simple statements and control flow statements.

Type checking: Type checking, type conversions, equivalence of type expressions, overloading of functions and operations. Context sensitive features- Chomsky hierarchy of languages and recognizers

UNIT–IV:

Run time storage: Storage organization, storage allocation strategies scope access to now local names, parameters, language facilities for dynamics storage allocation.

Code optimization: Principal sources of optimization of basic blocks, peephole optimization, flow graphs, data flow analysis of flow graphs.

UNIT-V:

Code generation: Machine dependent code generation, object code forms, generic code generation algorithm, register allocation and assignment using DAG representation of Block.

Text Books:

1. Compilers Principles, Techniques & Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi and Jeffery D. Ullman, Pearson Addison Wesley Education, Second Edition.
2. Modern Compiler Implementation in C, Andrew N. Appel, Cambridge University Press.

References:

1. Lex & yacc , John R. Levine, Tony Mason, Doug Brown, O‟reilly
2. Modern Compiler Design, Dick Grune, Henry E. BAL, Cariel T. H. Jacobs, Wiley dreamtech.
3. Engineering a Compiler, Cooper & Linda, Elsevier.
4. Compiler Construction, Louden, Thomson.
5. Systems Programming and Operating Systems, D

Course Outcomes:

Students will be able to:

1. Analyze phases of compilation, particularly lexical analysis, parsing, semantic analysis and code generation.
2. Construct parsing tables for different types of parsing techniques.
3. Classify the Semantic Analysis and Intermediate code generation phase.
4. Apply code optimization techniques to different programming languages.
5. Generate object code for natural language representations.

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

(F327B) COMPUTER NETWORKS

Course objectives:

Students will learn to:

1. Recognize various layering approaches for networking and understand the functionalities of physical layer.
2. Identify the data link layer protocols, multi access protocols, Ethernet technologies and various internetworking devices.
3. Examine design issues of network layer, services provided to above layer and routing, and congestion control protocols.
4. Restate IP protocol, addressing, various protocols like CIDR, ICMP, ARP and RARP of internet Layer and examination of transport layer services.
5. Reference Transport layer protocols like TCP, UDP, RPC and various congestion controlling mechanisms, including application layer services, protocols like HTTP, FTP, E-Mail etc.

UNIT–I:

Overview of the Internet: Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparison of the OSI and TCP/IP reference model.

Physical Layer: Guided transmission media, wireless transmission media.

UNIT–II:

Data Link Layer: Design issues, Framing, Error Detection and Error Correction, Block Coding, Hamming Distance, CRC, Flow control and error Control.

Protocols: Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols.

Connecting Devices: Repeaters, Hubs, Switches, Gateways and Bridges - Learning and Spanning tree bridges.

Multi Access protocols- Random access - . ALOHA, CSMA, CSMA/CD and CSMA/CA, Controlled access, Channelization. Ethernet IEEE 802.3, IEEE 802.5, IEEE 802.11

UNIT–III:

Network Layer: Network layer design issues, Store and forward packet switching, connection less and connection oriented network services.

Internetworking: Protocols-IPV4 and IPV6**,** Logical Addressing-IPV4, IPV6, Tunneling and Packet Fragmentation.

Address Mapping: ARP, RARP, DHCP, ICMP and IGMP.

Routing Algorithms: Shortest Path Finding and Distance Vector Routing Algorithms.

UNIT–IV:

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), The TCP Connection Establishment, The TCP Connection Release.

Crash recovery, The TCP sliding window, The TCP congestion control, Improving Quality of Service Techniques: Leaky Bucket Algorithm.

UNIT-V:

Application Layer: Introduction, services, Application layer paradigms.

Applications: DNS, WWW, HTTP, FTP, E-MAIL, TELNET, SNMP, SSH.

Text Books:

1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.

References:

1. "Computer Networks", 5E, Peterson, Davie, Elsevier
2. "Introduction to Computer Networks and Cyber Security", Chawan - HwaWu, Irwin, CRC Publications.
3. "Computer Networks and Internets with Internet Applications", Comer .

Course outcomes:

Students will be able to:

1. Demonstrate the networking concepts, various Layering approaches and their functionalities.
2. Understand the protocols of Data Link layer, how a medium can be shared among multiple devices, Ethernet technologies and internetworking devices used.
3. Work on fragmentation, assigning of logical address and judge on routing, congestion.
4. Demonstrate the working of IP Protocol, other protocols of internet layer and services of transport layer.
5. Explain the transport layer and application layer protocols, their working.

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

NETWORK SECURITY
(PROFESSIONAL ELECTIVE – I)

Course Objectives:

Students will learn to:

1. Learn about Information security, security attacks, threats, services, and mechanisms and Application of each of confidentiality, integrity, and availability.
2. Know the principles of public key encryption and private key encryption and the algorithms used for both.
3. Master in E-mail security understand the algorithms PGP, MIME and S/MIME
4. Analyse IP Security architecture and understand concepts of SSL (Secure socket layer), TLS (transport layer security) and SET (secure electronic transactions)
5. Become familiar with the basic categories of threats to computers and networks.

UNIT–I:

Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security

Types of Security attacks, Security services, Security Mechanisms, A model for Network **Security**

Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques

encryption and decryption, symmetric and asymmetric key cryptography, stenography, key range and key size, possible types of attacks.

UNIT–II:

Symmetric key Ciphers: Block Cipher principles & Algorithms (DES, AES, Blowfish), Differential and Linear Crypt Analysis Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption, function, Key distribution

Asymmetric key Ciphers: Principles of public key crypto systems, Algorithms (RSA, Diffie-Hellman, ECC), Key Distribution.

UNIT–III:

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm

Authentication Applications: Kerberos, X.509 Authentication Service, Public – Key Infrastructure, Biometric Authentication.

UNIT–IV:

E-Mail Security: Pretty Good Privacy, S/MIME

IP Security: IP security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, key management.

UNIT-V:

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction

Intruders, virus and Firewalls: Intruders, Intrusion detection, password management, virus and related threats, Countermeasures, Firewall design principles, types of firewalls

Case Studies on Cryptography and security: Secure Inter-Branch Payment Transactions, Cross site Scripting Vulnerability, Virtual E lections

Text Books:

1. Cryptography and Network Security: William Stallings, Pearson Education,4" 'Edition
2. Cryptography and Network Security : Atul Kahate, Mc Graw Hill Edition

References:

1. Cryptography and Network Security: C K Shyamala, N Harin i, Dr T R Padmanabhan, Wiley India, 1" Edition.
2. Cryptography and Network Security : Forouzan Mukhopadhyay, MC Graw Hill, 2"" Edition
3. Information Security, Principles and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM.Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

Course Outcomes:

Students will be able to:

1. Analyse theory of fundamental cryptography, what is an attack and threat different types of attacks, services and mechanisms.
2. Demonstrate how to encrypt "Plain Text" into "Cipher Text" and vice versa, using different encryption and decryption algorithms.
3. Label the need of e-mail security and the algorithms used
4. Identify the need of IP security architecture and concepts of SSL (Secure socket layer), TLS (transport layer security) and SET (secure electronic transactions).
5. Analyse what the Intruders, Viruses and related threats, are and how to design the Firewalls and Intrusion Detection Systems.

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III Year - II Semester	**3**	**0-0-0**	**3**

DATA ANALYTICS
(PROFESSIONAL ELECTIVE – I)

Course Objectives:

Students will learn to:

1. Apply analytics on Structured, Unstructured Data.
2. Exposure to Data Analytics with R.
3. Understand importance of descriptive Statistics & Inferential Statistics.
4. Analyze the importance of Machine Learning.
5. Restate the analytics of Big Data.

UNIT–I:

Descriptive Statistics

Introduction to the course, Descriptive Statistics, Probability Distributions

Inferential Statistics

Inferential Statistics through hypothesis tests, Permutation & Randomization Test

UNIT–II:

Machine Learning:

Introduction and Concepts, differentiating algorithmic and model based frameworks.
Regression: Ordinary Least Squares, Ridge Regression, Lasso Regression,
K Nearest Neighbours Regression & Classification.

UNIT–III:

Supervised Learning with Regression and Classification techniques -1:

Bias-Variance Dichotomy, Model Validation Approaches, Logistic Regression
Linear Discriminant Analysis, Quadratic Discriminant Analysis, Regression and Classification Trees, Support Vector Machines.

UNIT–IV:

Supervised Learning with Regression and Classification techniques -2:

Ensemble Methods: Random Forest, Neural Networks, Deep learning.

UNIT-V:

Unsupervised Learning and Challenges for Big Data Analytics:

Clustering, Associative Rule Mining, Challenges for big data analytics

Text Books:

1. Hastie, Trevor, et al. The elements of statistical learning. Vol. 2. No. 1. New York: springer, 2009.

References:

1. Montgomery, Douglas C., and George C. Runger. Applied statistics and probability for engineers. John Wiley & Sons, 2010

Course Outcomes:

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

1. Demonstrate the fundamentals of Machine Learning.
2. Understand different Statistics.
3. Elongate different supervised learning with regression.
4. Implement various Data streams.
5. Understand item sets, Clustering, frame works & Visualizations.

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

ADVANCED DATABASES
(PROFESSIONAL ELECTIVE – I)

Course Objectives:

Students will learn to:

1. Understand the basic concepts and terminology related to DBMS and Relational Database Design
2. Design and implement Distributed Databases.
3. Understand advanced DBMS techniques to construct tables and write effective queries, forms, and reports
4. Implement applications involving complex transaction processing.
5. Do query evaluation and query optimization.

UNIT–I:

Formal review of relational database and FDs Implication, Closure, its correctness

UNIT–II:

3NF and BCNF, Decomposition and synthesis approaches, Review of SQL99, Basics of query processing, external sorting, file

UNIT–III:

Processing of joins, materialized vs. pipelined processing, query transformation rules, DB transactions, ACID properties, interleaved executions, schedules, serialisability

UNIT–IV:

Correctness of interleaved execution, Locking and management of locks, 2PL, deadlocks, multiple level granularity, CC on B+ trees, Optimistic CC.

UNIT-V:

I/O based techniques, Multi version approaches, Comparison of CC methods, dynamic databases, Failure classification, recovery algorithm, XML and relational databases.

Text Books:

1. R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw Hill, 2004
2. A. Silberschatz, H. Korth, S. Sudarshan, Database system concepts, 5/e, McGraw Hill, 2008.

References:

1. K. V. Iyer, Lecture notes available as PDF file for classroom use.

Course Outcomes:

Students will be able to:

1. Exposure for students to write complex queries including full outer joins, self-join, sub queries, and set theoretic queries.
2. Knowhow of the file organization, Query Optimization, Transaction management, and database administration techniques.
3. Implement practical solutions to GIS database problems using OO/OR database, spatial database, data warehousing and data mining approaches.
4. Evaluate simple strategies for executing a distributed query to select the strategy that minimizes the amount of data transfer.
5. Demonstrate the issues involved in data integration for distributed query processing

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

MICROPROCESSORS AND MICROCONTROLLERS
(PROFESSIONAL ELECTIVE – II)

Course Objectives:

Students will learn to:

1. Interpret the basics of 8, 16-bit microprocessor architecture and its functionalities.
2. Understand the programming model of microprocessor.
3. Develop the microprocessor/ microcontroller based programs for various applications, DOS/BIOS programs.
4. Make the interfacing in between microprocessor and various peripherals.
5. Know basic feature of 8051 and AVR controller

UNIT–I:

8086 Architecture: 8086 Architecture-Functional diagram, Register organization, memory segmentation, programming model, memory addresses, physical memory organization.

Architecture of 8086, signal descriptions of 8086-common function signals, Timing diagrams, interrupts of 8086.

UNIT–II:

Instruction set and assembly language programming of 8086: instruction formats, addressing modes, instruction set.

Assembler directives, macros, simple programs involving logical, branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

UNIT–III:

I/O Interface: 8255 PPI, Various modes of operation and interfacing to 8086, interfacing keyboard, Display, D/A and A/D converter.

Interfacing with advanced devices: memory interfacing to 8086, interrupt structure of 8086, vector interrupt table, interrupt service routine.

Communication interface: serial communication standards, serial data transfer schemes, 8251 USART architecture and interfacing.

UNIT–IV:

Introduction to Microcontrollers: overview of 8051 microcontrollers, architecture, I/O ports. Memory organization, addressing modes and instruction set of 8051, simple programs.

UNIT-V:

8051 Real Time control: programming time interrupts, programming external hardware interrupts.

programming the serial communication interrupts, programming 8051 Timers and counters.

Text Books:

1. D.V.Hall, Microprocessors and interfacing , TMGH,2nd Edition 2006.
2. Kenneth.J.Ayala, The 8051 Microcontroler, 3rd Ed., Cengage Learning.

References:

1. Advanced Microprocessors and peripherals-A.K.Ray and K.M Bhurchandi, TMH, 2 nd Edition 2006.
2. The 8051 Microcontrollers. Architecture and programming and applications-K.Uma Rao, Andhe Pallavi, Pearson,2009.
3. Micro computer system 8086/8088 family architecture. Programming and design - Du and GA Gibson, PHI 2nd Edition.

Course Outcomes:

Students will be able to:

1. Explain 8086 microprocessors architectures and its functionalities.
2. Design and develop 8086 Microprocessor based systems for real time applications using low level language like ALP
3. Interface external peripherals and I/O devices and program the 8086 microprocessor.
4. Write Interrupt Service Routine (ISR) to handle interrupts in 8086 microprocessors to transmit data serially in Multi-processor applications.
5. Elongate the Architecture of 8051 Microcontroller and its applications.

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

PRINCIPLES OF COMMUNICATION
(PROFESSIONAL ELECTIVE – II)

Course Objectives:

Students will learn to:

1. Analyze system requirements of analog communication systems.
2. understand the need for modulation
3. understand the generation, detection of various analog modulation techniques and also perform the mathematical analysis associated with these techniques.
4. Analyze the noise performance of analog modulation techniques.
5. Learn the theoretical knowledge of each block in AM and FM receivers.

UNIT–I:

Amplitude Modulation: Introduction to communication system, need for modulation, Frequency Division Multiplexing, Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator.

Detection of AM Waves: Square law detector, Envelop detector, Double side band suppressed carrier modulators, time domain and frequency domain description, Detection of DSB-SC Modulated waves, COSTAS Loop.

UNIT–II:

SSB Modulation: Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves.

Demodulation of SSB Waves, Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelop detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

UNIT–III:

Angle Modulation: Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM.

Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM and AM.

UNIT–IV:

Noise in Analog Communication System: Types of Noise: Resistive (Thermal) Noise Source, Shot noise, Extra-terrestrial Noise, Arbitrary Noise Sources, White Noise, Narrowband Noise- In phase and quadrature phase components and its Properties, Modeling of Noise Sources, Average Noise Bandwidth, Effective Noise Temperature, Average Noise Figures, Average Noise Figure of cascaded networks.

Noise in DSB and SSB System Noise in AM System, Noise in Angle Modulation System, Noise Triangle in Angle Modulation System, Pre-emphasis and de-emphasis.

UNIT-V:

Receivers: Radio Receiver - Receiver Types - Tuned radio frequency receiver, Super hetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting.

Pulse Modulation: Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation and demodulation of PWM, PPM, Generation and demodulation of PPM, Time Division Multiplexing.

Text Books:

1. Communication Systems - Simon Haykin, 2 Ed, Wiley Publications.
2. Communication Systems – B.P. Lathi, BS Publication, 2004.
3. Electronic Communications - Dennis Roddy and John Coolean, 4th Edition, PEA, 2004.

References:

1. Electronic Communication Systems - Modulation and Transmission - Robert J. Schoenbeck, 2nd Edition, PHI.
2. Analog and Digital Communication - K. Sam Shanmugam, Wiley, 2005.

Course Outcomes:

Students will be able to:

1. Analyze and design various modulation and demodulation of analog systems.
2. Analyze the characteristics of noise present in analog systems.
3. Determine Signal to Noise Ratio (SNR) performance, of various Analog Communication systems.
4. Analyze and design the various Pulse Modulation Systems.
5. Design low power AM and FM transmitters.

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

OPTICAL COMMUNICATIONS
(PROFESSIONAL ELECTIVE – II)

Course Objectives:

Students will learn to:

1. Realize the significance of optical fibre communications.
2. Understand the construction and characteristics of optical fibre cable.
3. Develop the knowledge of optical signal sources and power launching.
4. Identify and understand the operation of various optical detectors
5. Understand the design of optical systems and WDM.

UNIT–I:

Overview of optical fiber communication: Historical development, The general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays. Cylindrical fibers- Modes, Vnumber, Mode coupling, Step Index fibers, Graded Index fibers.

Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index. Fiber materials — Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal distortion in optical fibers- Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses.

UNIT–II:

Information capacity determination, Group delay, Types of Dispersion: Material dispersion, Wave-guide dispersion, Polarization mode dispersion, Intermodal dispersion. Pulse broadening.

Optical fiber Connectors- Connector types, Single mode fiber connectors, Connector return loss. Fiber Splicing- Splicing techniques, Splicing single mode fibers. Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints.

UNIT–III:

Optical sources: LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations, Resonant frequencies. Reliability of LED and ILD.

Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling.

UNIT–IV:

Optical detectors: Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photodetectors.

Optical 124 receiver operations- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers.

UNIT-V:

Optical system design: Considerations, Component choice, Multiplexing. Point-to- point links, System considerations, Link power budget with examples, Overall fiber dispersion in Multimode and Single mode fibers, Rise time budget with examples.
Transmission distance, Line coding in Optical links, WDM, Necessity, Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye pattern.

Text Books:

1. Optical Fiber Communications – Gerd Keiser, McGraw-Hill International edition, 3rd Edition, 2000.
2. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002.

References:

1. Fiber Optic Communications – D.K. Mynbaev, S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal, John Wiley, 3rd Ediition, 2004.

Course Outcomes:

Students will be able to:

1. Analyze the constructional parameters of optical fibres.
2. Design an optical system.
3. Estimate the losses due to attenuation, absorption, scattering and bending.
4. Compare various optical detectors and choose suitable one for different applications.

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B. Tech. ECM	**L**	**T-P-D**	**C**
III Year - II Semester	**0**	**0-3-0**	**1.5**

(F3251) COMPILER DESIGN LAB.

Course Objectives:

Students will learn to:

1. Implement Lexical Analyzer using Lex tool & Syntax Analyzer or parser using YACC Tool.
2. Design & implement a front end of the compiler.
3. Implement NFA and DFA from a given regular expression.
4. Understand front end of the compiler by means of generating Intermediate codes.
5. Analyze code optimization techniques.

Experiment 1.

a) Write a C program to test whether a given identifier is valid or not
b) Write a C program to identify whether a given line is a comment or not.

Experiment 2

a) Write a C program to design a lexical analyzer
b) Write a C program to recognize strings under 'a', 'a*b+', 'abb'.

Experiment 3

Write a C program for constructing an NFA from given regular expression.

Experiment 4

a) Write a program to check whether a grammar is left recursive and remove left recursion.
b) Write a program to remove left factoring.

Experiment 5

a) Write a program to compute FIRST of non-terminals.
b) Write a program to compute FOLLOW of non-terminals.

Experiment 6

Write a C program for implementing the functionalities of predictive parser.

Experiment 7

Write a C program for constructing of LL (1) parsing

Experiment 8

a) Write a C program for constructing recursive descent parsing
b) Write a C program to implement LALR parsing

Experiment 9

Write a C program to generate machine code from abstract syntax tree generated by the parser

Experiment 10

Write a C program to generate intermediate code.

Course Outcomes:

Students will be able to:

1. Design & conduct experiments for NFA and DFA from a given regular expression
2. Design & implement a front end of the compiler.
3. Develop program for implementing symbol table.
4. Develop program for solving parser problems.
5. Create program for intermediate code generation.

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B. Tech. ECM	**L**	**T-P-D**	**C**
III Year - II Semester	**0**	**0-3-0**	**1.5**

(F3271) COMPUTER NETWORKS LAB.

Course objectives:

Students will learn to:

1. Implement data link layer farming methods such as: Character Stuffing and Bit Stuffing.
2. Identify Error control technique such as CRC-12 CRC-16 CRC-32.
3. Implementation Hamming Code error control algorithm and simulation of stop and wait protocol and Client-Server program
4. Implement network layer routing algorithms such as: Dijkstra's, Distance Vector and Broadcast routing techniques.
5. Identify addressing like port and IP Addresses

Experiment 1.

Implement the data link layer framing methods such as character stuffing and bit stuffing.

Experiment 2.

Implement the CRC polynomials - CRC 12, CRC 16 and CRC 32.

Experiment 3.

Implement the CRC encoding and decoding.

Experiment 4.

Implementation of Hamming Code.

Experiment 5.

Simulation of Stop and wait protocol.

Experiment 6.

Simulation of Stop and wait ARQ.

Experiment 7.

Implement of Dijsktra's Algorithm for finding Shortest Path.

Experiment 8.

Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table at each node using distance vector routing algorithm.

Experiment 9.

Take an example subnet of hosts. Obtain broadcast tree for it.

Experiment 10.

Write a program to display the socket's port and IP address

Experiment 11.

Simulation of TCP client and server program.

Experiment 12.

Using Sniffing tool Capture packets and Analyze

Text Books:

1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.

Course outcomes:

Students will be able to:

1. Understand data link layer framing methods such as : Character Stuffing Bit Stuffing
2. Write Error control techniques such as CRC-12 CRC-16 CRC-32.
3. Design Simulation of stop and wait protocol and Client-Server program
4. Understand network layer routing algorithms such as: Dijkstra's, Distance Vector and Broadcast routing techniques.
5. Identify for the shortest path in a given network

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B. Tech. ECM	**L**	**T-P-D**	**C**
III Year - II Semester	**0**	**0-4-0**	**2**

(F3272) MICROPROCESSORS AND MICROCONTROLLERS LAB

Course Objectives:

Students will learn to:

1. Write assembly language programming & embedded C.
2. Program and interfacing microprocessors to various devices
3. Program and interfacing microcontrollers to various devices.
4. Familiarize with the Timers and Counters concepts of a microcontroller.
5. Design various applications using microcontrollers.

List of Experiments:

Note: - Minimum of 12 experiments to be conducted.

The following programs/experiments are to be written for assembler and execute the same with 8086 and 8051 kits.

1. Programs for 16 bit arithmetic operations for 8086 (using various addressing Modes).
2. Program for sorting array for 8086.
3. Program for searching for a number or character in a string for 8086.
4. Program for string manipulation for 8086.
5. Program for digital clock design using 8086.
6. Interfacing ADC and DAC to 8086.
7. Parallel communication between two microprocessors using 8255.
8. Serial communication between two microprocessors using kit 8251.
9. Interfacing to 8086 and programming to control stepper motor.
10. Programming using arithmetic, logical and bit manipulation instructions of 8051.
11. Program and verify Timer/Counter in 8051.
12. Program and verify interrupt handling in 8051.
13. UART Operation in 8051.
14. Communication between 8051 kit and PC
15. Interfacing LCD to 8051.
16. Interfacing Matrix/keyboard to 8051.

Course Outcomes:

Students will be able to:

1. Write assembly language programming & embedded C.
2. Interface microprocessors to various devices.
3. Interface microcontrollers to various devices.
4. Write and perform Timer and Counter programs
5. Analyze and develop various applications using microcontrollers.

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

BIG DATA ANALYTICS

(PROFESSIONAL ELECTIVE – III)

Course Objectives:

Students will learn to:

1. Optimize business decisions and create competitive advantage with Big Data analytics
2. Explore the fundamental concepts of big data analytics.
3. Understand the various search methods and visualization techniques.
4. Understand the applications using Map Reduce Concepts.
5. Introduce programming tools PIG & HIVE in Hadoop echo system.

UNIT–I:

Big Data Analytics: What is big data, History of Data Management; Structuring Big Data; Elements of Big Data; Big Data Analytics; Distributed and Parallel Computing for Big Data;

Big Data Analytics: What is Big Data Analytics, What Big Data Analytics Isn't, Why this sudden Hype Around Big Data Analytics, Classification of Analytics, Greatest Challenges that Prevent Business from Capitalizing Big Data; Top Challenges Facing Big Data; Why Big Data Analytics Important; Data Science; Data Scientist; Terminologies used in Big Data Environments; Basically Available Soft State Eventual Consistency (BASE); Open source Analytics Tools.

UNIT–II:

Understanding Analytics and Big Data: Comparing Reporting and Analysis, Types of Analytics; Points to Consider during Analysis; Developing an Analytic Team; Understanding Text Analytics;

Analytical Approach and Tools to Analyze Data: Analytical Approaches; History of Analytical Tools; Introducing Popular Analytical Tools; Comparing Various Analytical Tools.

UNIT–III:

Understanding MapReduce Fundamentals and HBase: The MapReduce Framework; Techniques to Optimize MapReduce Jobs; Uses of MapReduce; Role of HBase in Big Data Processing;

Storing Data in Hadoop : Introduction of HDFS, Architecture, HDFC Files, File system types, commands, org.apache.hadoop.io package, HDF, HDFS High Availability; Introducing HBase, Architecture, Storing Big Data with HBase , Interacting with the Hadoop Ecosystem; HBase in Operations-Programming with HBase; Installation, Combining HBase and HDFS;

UNIT–IV: Big Data Technology Landscape and Hadoop: NoSQL, Hadoop; RDBMS versus Hadoop; Distributed Computing Challenges; History of Hadoop;

Hadoop Overview; Use Case of Hadoop; Hadoop Distributors; HDFC (Hadoop Distributed File System), HDFC Daemons, read, write, Replica Processing of Data with Hadoop; Managing Resources and Applications with Hadoop YARN.

UNIT-V:

Social Media Analytics and Text Mining: Introducing Social Media; Key elements of Social Media; Text mining; Understanding Text Mining Process; Sentiment Analysis, Performing Social Media Analytics and Opinion Mining on Tweets;

Mobile Analytics: Introducing Mobile Analytics; Define Mobile Analytics; Mobile Analytics and Web Analytics; Types of Results from Mobile Analytics; Types of Applications for Mobile Analytics; Introducing Mobile Analytics Tools;

Text Books:

1. BIG DATA and ANALYTICS, Seema Acharya, Subhasinin Chellappan, Wiley publications.
2. BIG DATA, Black Book™ , DreamTech Press, 2015 Edition.

References:

1. BUSINESS ANALYTICS 5e , BY Albright |Winston

Course Outcomes:

Students will be able to:

1. Work with big data platform and explore the big data analytics techniques business applications.
2. Design efficient algorithms for mining the data from large volumes.
3. Analyze the HADOOP and Map Reduce technologies associated with big data analytics.
4. Explore on Big Data Applications Using Pig and Hive.
5. Understand the fundamentals of various big data analytics techniques.
6. Build a complete business data analytics solution.

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NEURAL NETWORK

(PROFESSIONAL ELECTIVE III)

Course Objectives:

Students will learn to:

1. Understand the differences and similarities neural network, human brain and feedback systems
2. Learn the different learning techniques
3. Familiar with the concept of single layer perceptron and its algorithms.
4. Familiar with the concept of multilayer perceptron and its algorithms
5. Know the self-organisation mapping techniques.

UNIT–I:

Introduction: What is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks.

UNIT–II:

Learning Process: Error Correction learning, Memory based learning, Hebbianlearing, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process.

UNIT–III:

Single layer perceptrons: Adaptive filtering problem, Uncontrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perception-convergence theorem, Relation between perception and Bayes classifier foe a Gaussian Environment.

UNIT–IV:

Multilayer Percertron: Back propagation algorithm XOR problem, Heuristics, Output representation and decision rule, comuter experiment, feature detection.

UNIT-V:

Neuro Dynamics: Dynamical systems, stability of equilibrium states, attractors, neuro dynamical models, manipulation of attractors as a recurrent network paradigm.

Hopfield models: Hopfield models, computer experiment.

Text Books:

1. Neural networks A comprehensive foundation, Simon Hhaykin, PHI edition.
2. Artificial neural networks-B.Vegnanarayana Prentice Halll of India P Ltd 2005.

References:

1. Neural networks in Computer intelligence, Li Min Fu TMH 2003.
2. Neural networks James A Freeman David M S kapurapearson education 2004.

Course Outcomes:

Students will be able to:

1. Know differences and similarities between neural network, human brain and feedback systems
2. Get the knowledge of different learning techniques
3. Describe the concept of single layer perceptron and its algorithms.
4. Describe the concept of multilayer perceptron and its algorithms.
5. Analyse the self-organisation mapping techniques.

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INTERNET OF THINGS

(PROFESSIONAL ELECTIVE – III)

Course Objectives:

Students will learn to:

1. Understand the basic building blocks of IoT.
2. Analyze the difference between M2M and IoT along with IoT system Management
3. Extend the knowledge in Logical Design of IoT System using Python.
4. Acquire knowledge about IoT Physical Devices and End points.
5. Identify the IoT Physical Servers and cloud offerings.

UNIT–I:

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs

IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

UNIT–II:

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT

Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER.

UNIT–III:

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling
Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib.

UNIT–IV:

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming

Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT-V:

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver

Web server for IoT, Cloud for IoT, Python web application framework

Designing a RESTful web API

Text Books:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

Course Outcomes:

Students will be able to:

1. Analyze the physical design of IoT along with IoT Enabling Technologies.
2. Compare and contrast M2M and IoT, SDN and NFV, NETCONG-YANG
3. To familiarize students with the Python.
4. Understand the IoT with exemplary Device as Raspberry Pi along with programming.
5. Learn about cloud storage models, web application frameworks of IoT

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VLSI DESIGN

(PROFESSIONAL ELECTIVE –IV)

Course Objectives:

Students will learn to:

1. Understand the steps involved in IC fabrication and to learn basic electrical properties of MOS &BICMOS circuits.
2. Understand VLSI circuit design processes representations of stick diagram &layout diagram.
3. Know the gate level design & delays.
4. Know different combinational & sequential circuits to design the subsystems like ALUs, shifters, adders etc.
5. Understand the importance of CPLDs and FPGAs for implementing the variety logic functions

UNIT–I:

Introduction: Introduction to IC TECHNOLOGY-MOS, PMOS, NMOS, CMOS and BiCMOS

Basic Electric Properties: Basic electrical Properties of MOS and BiCMOS Circuits: Ids-Vds relationships, MOS transistor threshold voltage, gm, gds, Figure of merit, pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS inverters.

UNIT–II:

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rule and layout, 2µm CMOS design rules for wires Contacts and Transistors.
layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS Circuits.

UNIT–III:

Gate Level Design: Logic Gates and Other complex gates, Switch logic, alternate gate circuits, time delays
Driving large capacitive loads, wiring capacitance, Fan-in, Fan-out, Choice of layers.

UNIT–IV:

Data path Subsystems: Subsystems Design, Shifters, Adders, ALUs, Multipliers, Parity generators, comparators, Zero/One Detectors, Counters
Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories.

UNIT-V:

Programmable Logic Devices: PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, design Approach, Parameters influencing low power design.

CMOS Testing: CMOS Testing, Need for testing, Test Principles, Design Strategies for test chip level Test Techniques.

Text Books:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, 2005 Edition
2. CMOS VLSI Design – A circuits and systems perspective, Neil H. E Weste, David Harris, Ayan Banerjee, pearson, 2009.
3. VLSI Design-M.Michael Vai,2001,CRC Press.

References:

1. Introduction to VLSI Systems: A Logic-Circuit and Systems Perspective-Ming _BO-Lin, CRC Press-2011.
2. MOS logic circuit Design - John.P. Uyemura, Springer, 2007.
3. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.

Course Outcomes:

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

1. Write the electrical properties of MOS circuits.
2. Excel in the design of various gates, adders, Multipliers and Memories using stick diagrams, layouts.
3. Determine the IC design such as PLA's, PAL, FPGA, CPLDs.
4. Find the subsystems with CMOS TECHNOLOGY.
5. Identify the differential strategies for testing of IC's and CMOS testing

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CELLULAR AND MOBILE COMMUNICATIONS

(PROFESSIONAL ELECTIVE –IV)

Course Objectives:

Students will learn to:

1. Learn the basics of the Cellular concept, Frequency reuse, Hand-off strategies.
2. Analyze and understand wireless and mobile cellular communication systems over a stochastic fading channel
3. Understand Co-channel and Non- Co-channel interference
4. Acquire knowledge in cell coverage for signal and traffic, diversity techniques and mobile antennas.
5. Acquaint frequency management, Channel assignment and types of handoff.

UNIT–I:

Introduction to Cellular Mobile Radio Systems: Limitations of conventional mobile telephone systems, Basic Cellular Mobile System, First, second, third and fourth generation cellular wireless systems.

Uniqueness of mobile radio environment-Long term fading, Factors influencing short term fading, Parameters of mobile multipath fading-Time dispersion parameters, Coherence bandwidth, Doppler spread and coherence time, Types of small scale fading.

UNIT–II:

Fundamentals of Cellular Radio System Design: Concept of frequency reuse, Co-channel interference, Co-channel Interference reduction factor, Desired C/I from a normal case in a Omni directional antenna system, system capacity, Trunking and grade of service, Improving coverage and capacity in cellular systems- Cell splitting, Sectoring, Microcell zone concept.

Measurement of real time Co-Channel interference, Design of antenna system, Antenna parameters and their effects, Diversity Techniques-Space diversity, Polarization diversity, Frequency diversity, Time diversity. Adjacent channel interference, Near end far end interference, Cross talk, Effects on coverage and interference by power decrease, Antenna height decrease, Effects of cell site components, UHF TV interference

UNIT–III:

Cell Coverage for Signal and Traffic: Signal reflections in flat and hilly terrain, Effect of human made structures, Phase difference between direct and reflected paths, Constant standard deviation, Straight line path loss slope.

General formula for mobile propagation over water and flat open area, Near and long-distance propagation, Path loss from a point to point prediction model in different conditions, merits of Lee model.

UNIT–IV:

Cell Site and Mobile Antennas: Sum and difference patterns and their synthesis, Coverage-omni directional antennas, Interference reduction.

Directional antennas for interference reduction, Space diversity antennas, Umbrella pattern antennas, and Minimum separation of cell site antennas, mobile antennas.

UNIT-V:

Frequency Management and Channel Assignment& Handoffs: Numbering and grouping, Setup access and Paging channels, Channel assignments to cell sites and mobile units, Channel sharing and Borrowing, Sectorization.

Overlaid cells, nonfixed channel assignment, Handoff initiation, Types of handoff, delaying handoff, Advantages of handoff, Power difference handoff, Forced handoff, Mobile assisted and soft handoff. Intersystem handoff, Introduction to dropped call rates and their evaluation.

Text Books:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Mc Graw Hill, 2nd Edn., 1989.
2. Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.

References:

1. Principles of Mobile Communications – Gordon L. Stuber, Springer International, 2nd Edn., 2001.
2. Modern Wireless Communications-Simon Haykin, Michael Moher,Pearson Eduction, 2005.
3. Wireless communications theory and techniques, Asrar U. H.Sheikh, Springer, 2004.

Course Outcomes:

Students will be able to:

1. Identify the difference between wired communication and wireless cellular communication.
2. Measure the performance of a cellular system.
3. Classify multiple access techniques in mobile communication.
4. Analyze why to use Hexagonal shaped cells.
5. Differentiate between Analog and Digital Cellular systems.

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TELECOMMUNICATION SWITCHING SYSTEMS AND NETWORKS

(PROFESSIONAL ELECTIVE – IV)

Course Objectives:

Students will learn to:

1. Understand basics of the concepts and principles of optical fibre communications, line.
2. Explain transmission systems, satellite communication systems.
3. Understand different switching techniques.
4. Understand the concepts of signalling.
5. Analyse the different types of network.

UNIT - I:

Switching Systems: Evolution of Telecommunications; Basics of a Switching System; Functions of a Switching System; Crossbar Switching-Principle of Crossbar Switching; Crossbar Switch Configurations; Cross-Point technology; Crossbar Exchange Organization; A General Trucking; Electronic Switching; Digital Switching Systems.

Telecommunications Traffic: Introduction; The Unit of Traffic; Congestion; Traffic Measurement; A Mathematical Model; Lost-Call Systems-Theory; Traffic Performance; Loss Systems in Tandem; Use of Traffic Tables; Queuing Systems-The Second Erlang Distribution; Probability of Delay; Finite Queue Capacity; Some Other Useful Results; Systems with a Single Server; Queues in Tandem; Delay Tables; Applications of Delay Formula.

UNIT - II:

Switching Networks: Single Stage Networks; Grading-Principle; Two Stage Networks; Three Stage Networks; Four Stage Networks

Time Division Switching: Basic Time Division Space Switching; Basic Time Division Time Switching; Time Multiplexed Space Switching; Time Multiplexed Time Switching; Combination Switching; Three Stage Combination Switching. Control of Switching Systems: Call Processing Functions-Sequence of Operations; Signal Exchanges; State Transition Diagrams; Common Control; Reliability; Availability and Security; Stored Program Control.

UNIT - III:

Signaling: Introduction; Customer Line Signaling; Audio Frequency Junctions and Trunk Circuits; FDM Carrier Systems-Outband Signaling; in band (VF) Signaling; PCM Signaling; Inter Register Signaling;

Common Channel Signaling Principles-General Signaling Networks; CCI I I Signaling System Number 6; CCI - I Signaling System Number 7; The High Level Data Link Control Protocol;

Signal Units; The Signaling Information Field.

UNIT - IV:

Packet Switching: Introduction; Statistical Multiplexing; Local Area and Wide Area Networks-Bus Networks; Ring Networks; Comparison of Bus and Ring Networks; Optical Fiber Networks; Large Scale Networks-General;

Datagrams and Virtual Circuits; Routing; Flow Control; Standards; Frame Relay; Broadband Networks-General; The Asynchronous Transfer Mode; ATM Switches.

UNIT - V:

Networks: Introduction; Analog Networks; Integrated Digital Networks; Integrated Services Digital Networks; Cellular Radio Networks; Intelligent Networks;

Private Networks; Charging; Routing — General, Automatic Alternative Routing.

Text Books:

1. J. E Flood, "Telecommunications Switching and Traffic Networks," Pearson Education, 2006.
2. Tyagarajan Viswanathan, "Telecommunications Switching Systems and Networks," Prentice Hall of India Pvt. Ltd., 2006.

References:

1. John C Bellamy, "Digital Telephony John Wiley International Student Edition,3rd Edition, 2000.
2. Behrouz A. Forouzan, "Data Communications and Networking," TMH, 2nd Edition, 2002.
3. Tomasi, "Introduction to Data Communication and Networking," Pearson Education, 1st Edition, 2007

Course Outcomes:

Students will be able to:

1. Summarize the need for switching systems and their evolution from analogue to digital.
2. Differentiate Public Switched Telephone Network and private networks.
3. Compare telephone network, data network and integrated service digital network
4. Differentiate between signalling methods used in Telecommunication Networks
5. To work on various Telecommunication Network concepts

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EMBEDDED SYSTEMS

(PROFESSIONAL ELECTIVE – V)

Course Objectives:

Students will learn to:

1. Understand the basic concepts of embedded systems and 8051 microcontrollers.
2. Compare and contrast the basics of assembly programming language.
3. Identify the unique characteristics of real-time systems
4. Analyze the general structure of a real-time system and define the unique design problems and challenges of real-time systems.
5. Acquaint the embedded software development tools and various advanced architectures.

UNIT–I:

Embedded Computing: Introduction, complex systems and microprocessor
The embedded system design process, formalisms for system design, design examples.

UNIT–II:

The 8051 Architecture: Introduction, 8051 micro controller hardware, input/output ports and circuits, external memory, counter and timers, serial data input/output, interrupts.

Basic Assembly Language Programming Concepts: The assembly language programming process, programming tools and techniques, programming the 8051. Data transfer and logical instructions, arithmetic operations, decimal arithmetic, jump and call instructions.

UNIT–III:

Introduction to Real-Time Operating Systems: Tasks and task states, tasks and data, semaphores, and shared data; message queues, mailboxes and pipes, timer functions, events, memory management, interrupt routines in an RTOS environment.

Basic Design Using a Real-Time Operating System: Principles, semaphores and queues, hard real-time scheduling considerations, saving memory and power, an example RTOS like uC-OS (open source)

UNIT–IV:

Embedded Software Development Tools: Host and target machines, linker/locators for embedded software, getting embedded software into the target system.
Debugging Techniques: Testing on host machine, using laboratory tools, an example system.

UNIT-V:

Introduction to advanced Architectures: ARM and SHARC, processor and memory organization and instruction level parallelism; networked embedded systems:
Bus protocols, I2C bus and CAN bus; internet-enabled systems, design example-elevator controller.

Text Books:

1. Wayne Wolf (2008), Computers as Components-principles of embedded computer system design, Elsevier, New Delhi, India.
2. Kenneth J. Ayala (2008), The 8051 Microcontroller, 3rd edition, Cengage Learning, India.

References:

1. David E. Simon (1999), An Embedded Software Primer, Pearson Education, India.
2. Jean J. Labrosse (2000), Embedding System Building Blocks, 2nd edition, CMP publishers, USA.
3. Raj Kamal (2004), Embedded Systems, Tata McGraw hill, India.

Course Outcomes:

Students will be able to:

1. Program an embedded system
2. Analyze Interfacing with keyboard, A/D & D/A conversions, serial data Communication, LCD and LED display.
3. Illustrate Tasks, Semaphores, Message queues, pipes, Timer functions.
4. Design embedded systems and real-time systems
5. Compare and contrast ARM, SHARC, internet enabled systems.

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IMAGE PROCESSING AND PATTERN RECOGNITION

(PROFESSIONAL ELECTIVE – V)

Course Objectives:

Students will learn to:

1. Fundamental concepts of a digital image processing system
2. Various Image Transforms.
3. Compression techniques and Morphological concepts
4. Various segmentation techniques, and object descriptors.
5. Fundamental concepts of a Pattern Recognition

UNIT–I:

Fundamental steps of image processing, components of an image processing system. The image model and image acquisition, sampling and quantization, relationship between pixels, distance functions, scanner.

Statistical and spatial operations, Intensity functions transformations, histogram processing, smoothing & sharpening – spatial filters Frequency domain filters, homomorphism filtering, image filtering & restoration. Inverse and wiener filtering. FIR wiener filter. Filtering using image transforms, smoothing splines and interpolation.

UNIT–II:

Morphological and other area operations, basic morphological operations, opening and dosing operations, dilation erosion, Hit or Miss transform, morphological algorithms, extension to grey scale images.

Segmentation and Edge detection region operations, basic edge detection, second order detection, crack edge detection, gradient operators, compass and Laplace operators, edge inking and boundary detection, thresholding, region based segmentation, segmentation by morphological watersheds.

UNIT–III:

Image compression: Types and requirements, statistical compression, spatial compression, contour coding, quantizing compression

Image data compression-predictive technique, pixel coding, transfer coding theory, lossy and lossless predictive type coding, Digital Image Water marking.

UNIT–IV:

Representation and Description: Chain codes, Polygonal approximation, Signature Boundary Segments, Skeltons Boundary Descriptors, Regional Descriptors, Relational Descriptors, Principal components for Description, Relational Descriptors.

UNIT-V:

Pattern Recognition Fundamentals Basic Concepts of pattern recognition, Fundamental problems in pattern recognition system, design concepts and methodologies. Exarrfe of automatic pattern recognition systems. a simple automatic pattern recognition model.

Pattern classification: Pattern classification by distance function: Measures of similarity. Clustering criteria. K.means algorithm. Pattern classification by likehhood function: Pattern classification as a Statistical decision problem. Bayes classifier for normal patterns.

Text Books:

1. Digital Image Processing Third edition. Pearson Education. Rafael C. Gonzalez, Richard E. Woods.
2. Pattern recognition Principles: Jufus T. Tou, and Rafel C. Gonzalez, Addislon-Wesfy Publishing Company.
3. Digital Image Processing. M.Anji Reddy. Y.Hari Shankar, BS Publications.

References:

1. image Processing. Analysis and Machine Vision, Second Edition, Milan Sonka. Vaciav Hlavac and Roger Boie. Thomson learning
2. Digital Image Processing – William k. Prati -John Wiley edition.
3. Fundamentals of digital image processing – by A.K. Jam, PHI.
4. Pattern classification. Richard Duda. Hart and David strok John Wiley publishers.
5. Digital Image Processing, S.Jayaraman.S. Esakkirajan, T.Veerakumar. TMH.
6. Pattern Recognition. R.Shinghal. Oxford University Press.

Course Outcomes:

Students will be able to:

1. Analyze the concepts of a digital image processing system
2. Identify and describe operation of different smoothing and sharpening filters.
3. Analyze the different segmentation techniques
4. Apply different de-noising models to recover original image.
5. Identify different pattern recognition methods and apply them in problem areas.

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WIRELESS SENSOR NETWORKS

(PROFESSIONAL ELECTIVE –V)

Course Objectives:

Students will learn to:

1. Understand the fundamentals of wireless sensor networks
2. Introduction to planning and design of wireless networks.
3. Introduction to HSPA systems.
4. To study emerging technologies like Bluetooth, ZigBee, WiMAX.
5. Understanding the wireless sensor network architecture and the protocol stack and WSN applications.

UNIT–I:

Introduction Unique constraints and challenges, advantages of Sensor Networks, Sensor Network Applications, Collaborative Processing, Overview and applications of Wireless Sensor Networks.

Basic Wireless Sensor Technology-Sensor Node Technology, Sensor Taxonomy, WN operating Environment, WN trends. Radio Propagation primer.

UNIT–II:

MAC protocols for Wireless Sensor Networks Introduction, Background, Fundamentals of MAC protocols.

MAC protocols for WSNs, Sensor-MAC case study, IEEE 802.15.4 LR-WPANs standard case study.

UNIT–III:

Routing protocols for Wireless Sensor Networks Introduction, background, Data dissemination and gathering, routing challenges and design issues, routing strategies in wireless sensor networks.

Networking Sensors Key assumptions, Medium Access Control, General Issues, Geographic, Energy-Aware Routing, Attribute-based Routing.

UNIT–IV:

Transport Control protocols for Wireless Sensor Networks Traditional Transport control protocols, Transport protocol design issues, Examples of existing transport control protocols, performance of transport control protocols.

Performance and Traffic Management Introduction, background, WSN Design Issues,

Performance Modeling of WSNs, Case Study-Simple computation of the system life span.

UNIT-V:

Network Management for Wireless Sensor Networks Introduction, Network management requirements, traditional network management models, network management design issues, MANNA, Naming and Localization.

Operating Systems for Wireless Sensor Networks Introduction, operating system design issues, Examples of operating systems-TinyOS, Mate, MagnetOS, MANTIS, OSPM, EYES OS, SenOS, EMERALDS, PicOS.

Text Books:

1. Wireless Sensor Networks- Technology, protocols and applications, Kazem Sohraby, Daniel Minoli and Taieb Znati, Wiley Student Edition.
2. Wireless Sensor Networks-An Information processing approach, Feng Zhao, Leonidas Guibas, Morgan Kaufmann publications, 2004.

References:

1. Adhoc Mobile Wireless Networks-Principles, Protocols and Applications, Subir kumar Sarkar, T G Basavaraju and C Puttamadappa, Auerbach Publications, Taylor & Francis group.
2. Adhoc Wireless Networks-Architectures and Protocols, C. Siva Ram Murthy and B.S. Manoj, Pearson Education

Course Outcomes:

Students will be able to:

1. Describe the phases of planning and design of mobile wireless networks.
2. List and compare personal area network (PAN) technologies such as ZigBee, Bluetooth etc.
3. Describe in detail of sensor network architecture, traffic related protocols, transmission technology etc
4. Explain the design considerations for deploying the wireless network infrastructure.
5. Understand middleware protocol and network management issues of sensor networks

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SOFTWARE ENGINEERING

(PROFESSIONAL ELECTIVE – VI)

Course Objectives:

Students will learn to:

1. Relate about software myths, generic view of the process and Understand about process models
2. Understand how to perform feasibility study of the projects under the requirement engineering process and system models.
3. Know about Function oriented design and Architectural styles.
4. Become familiar in software testing and testing strategies.
5. Acquaint with risk management plan and quality concepts.

UNIT–I:

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, legacy software, Software myths. A Generic view of process: Software engineering- A layered TECHNOLOGY, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

Process models: The waterfall model, Incremental process models, Evolutionary process models, Specialized process models, The Unified process.

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, Behavioural models, Data models, Object models, structured methods.

UNIT–III:

Design Engineering: Design process and Design quality, Design concepts, the design model, pattern based software design.

Creating an architectural design: software architecture, Data design, Architectural styles and patterns, Architectural Design, assessing alternative architectural designs, mapping data flow into a software architecture.

Modeling component-level design: Designing class-based components, conducting component-level design, object constraint language, designing conventional components.

Performing User interface design: Golden rules, User interface analysis, and design, interface analysis, interface design steps, Design evaluation.

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, Frame work for Product metrics, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

Metrics for Process and Products: Software Measurement, Metrics for software quality.

UNIT-V:

Risk management: Reactive vs Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.
Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software Quality Assurance, Software reliability, The ISO 9000 quality standards.

Text Books:

1. Software engineering A Practitioner's Approach, Roger S Pressman, sixth edition McGraw Hill International Edition.
2. Software Engineering, Ian Sommerville, seventh edition, Pearson education.

References:

1. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
2. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
3. Fundamentals of Software Engineering, Rajib Mall, PHI, 2005
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford.

Course Outcomes:

Students will be able to:

1. Design and develop real-time software projects with effective cost estimation and plan
2. Make feasibility study of a project
3. Specify the design and architectural style of the software products
4. Implement testing strategy for a given software.
5. Design and architectural style of the software products.

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CLOUD COMPUTING
(PROFESSIONAL ELECTIVE – VI)

Course Objectives:

Students will learn to:

1. Categorize cloud computing and its techniques, issues, and its services that will lead to design and development of a simple cloud service.
2. Understand with the concepts of Infrastructure as a Service, Platform as a Service and Software as a Service of Cloud Service Models.
3. Familiarize with secure distributed data storage in cloud computing.
4. Compare Learn Monitoring, Management and Applications of Cloud Architecture.
5. Analyse the governance of Cloud Era with the help of case studies.

UNIT–I:

Foundations

Introduction to cloud computing, migrating into a cloud

enriching the integration as a service paradigm for the cloud ERA, the enterprise cloud computing paradigm.

UNIT–II:

Infrastructure as a service (IAAS) & platform and software as a service (PAAS/SAAS):

Virtual machines provisioning and migration services

on the management of virtual machines for cloud infra structures enhancing cloud computing environments using a cluster as a service

UNIT–III:

Secure distributed data storage in cloud computing:

Aneka, comet cloud, T-Systems, work flow Engine for clouds understanding scientific applications for cloud environments.

UNIT-IV:

Monitoring, Management and Applications:

An Architecture for Federated Cloud Computing, SLA Management in Cloud Computing, Performance Prediction for HPC on Clouds

Best practices in Architecting Cloud Applications AWS Cloud.

UNIT-V:

Governance and Case Studies

Organization and Readiness and Change Management in the Cloud age, Data Security in the Cloud

Legal Issues in Cloud Computing, Achieving Production Readiness for Cloud Services.

Text Books:

1. Cloud Computing: Principles and paradigms by Rajkumar Buyya , james Borerg and Andrzej M.Goscinski,Wiley,2011
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C.Fox ,Jack J. Dongarrra, Elsevier,2012.

References:

1. Cloud Computing: Apractical Approach, Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, Tata McGraw Hill,rb2011.
2. Entterprise Cloud Computing, Gautam Shroff,Cambridge Ub=niversity press, 2010.
3. Cloud Computing: Implementation, Management and Security, John W. Rittinghouse, James F. Ratting house, Jamus F. Ransome, CRC Press.rp2012

Course Outcomes:

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

1. Elongate the key dimensions of the challenge of Cloud Computing.
2. Identify the architecture and Infrastructure of cloud including CAAS, PAAS and IAAS.
3. Evaluate the various cloud development tools with secured data storage in cloud.
4. Understand monitoring, management and applications of cloud infra structure.
5. Implement the case studies to derive the best practice model to apply when developing and deploying cloud based applications.

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

DATA MINING
(PROFESSIONAL ELECTIVE – VI)

Course Objectives:
Students will learn to:

1. State data mining concepts and pre-processing techniques.
2. Contrast association mining rules.
3. Discuss classification algorithms learn how data is grouped using clustering techniques.
4. Understand how to perform clustering large data sets.
5. Describe web mining and to extract knowledge from web.

UNIT–I:
Introduction to Data Mining: Introduction, what is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Pre-processing, Data Cleaning, Missing data.
Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation, Data Transformation; Measures of Similarity and Dissimilarity- Basics.

UNIT–II:
Association Rules: Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIOIRI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set.

UNIT–III:
Classification: Problem Definition, General Approaches to solving a classification problem, Evaluation of Classifiers, Classification techniques, Decision Trees-Decision tree Construction.
Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision Tree Induction; Naive-Bayes Classifier, Bayesian Belief Networks; K-Nearest neighbour classification-Algorithm and Characteristics.

UNIT–IV:
Clustering: Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms, Partitioning Clustering-K-Means Algorithm, K-Means Additional issues, PAM Algorithm; Hierarchical Clustering-Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and Weakness; Outlier Detection.

UNIT-V:

Web and Text Mining: Introduction, web mining, web content mining, web structure mining, we usage mining, Text mining –unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.

Text Books:

1. Data Mining- Concepts and Techniques- Jiawei Han, Micheline Kamber, MorganKaufmann Publishers, Elsevier, 2 Edition, 2006.
2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.
3. Data mining Techniques and Applications, Hongbo Du Cengage India Publishing.

References:

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Data Mining Principles & Applications – T.V Sveresh Kumar, B.Esware Reddy, Jagadish S Kalimani, Elsevier.
3. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press

Course Outcomes:

Students will be able to:

1. Identify the association rules and apply mining techniques on it.
2. Perform classification in large data sets.
3. Solve real world problems in business and scientific information using data Mining.
4. Perform clustering in large data sets
5. Classify web pages, extracting knowledge from the web.

Open Elective – I

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

ENERGY AUDIT AND GREEN BUILDING
(Open Elective-I)

COURSE OBJECTIVES:

The Student Will:

1. Create awareness about the principles of green building technology and to have insight about the criteria for rating systems along with the established Indian codes and guidelines.
2. Establish a clear understanding of various renewable and non-renewable sources of energy along with their carbon footprints and enumerates the process of performance testing including building modeling and energy analysis.
3. Discuss about the energy efficient green building materials and to have understanding on the cost-effective Building Technologies, Strategies for Green Building Systems and Energy Conservation Measures.
4. Give details on the principles of sustainable development in green building design.
5. Describe the best green building practices adopted along with cost/benefit and life-cycle analysis of green buildings.

UNIT-1

Sources of Energy:

Renewable and Non-renewable sources of energy - Coal, Petroleum, Nuclear, Wind, Solar, Hydro, Geothermal sources, potential of these sources, hazards, pollution with reference to Global scenario, demand and supply in India, Global efforts to reduce carbon emissions, Performance testing. Building modeling- Energy analysis, Metering, Monitoring.

Carbon emission: Forecasting, Control of carbon emission, Air quality and its monitoring carbon footprint, Environmental issues, Minimizing carbon emission, Energy retrofits and Green Remodels.

UNIT-II

Green Building Materials: Sustainable Materials, Depletion of natural resources for preparation of building materials, renewable and recyclable resources, energy efficient materials, Embodied Energy of Materials. Green cement, Biodegradable materials, Smart materials, Manufactured Materials, Volatile Organic Compounds (Voc's), Natural Non-Petroleum Based Materials, Recycled materials, Renewable and Indigenous Building Materials, Engineering evaluation of these materials.

Green Building Planning and Specifications: Environment friendly and cost effective Building Technologies, Integrated Life cycle design of Materials and Structures, Green Strategies for Building Systems, Alternative Construction Methods, Energy Conservation Measures in Buildings, Waste and Water management and Recycling by Sustainable Facilities, Heating, Ventilation and Air Conditioning, Passive Solar and Daylight, Plumbing and its Effect on Energy Consumption

UNIT -III

Concept of Green Buildings: Green building - Definition, Features, Necessity, Initiatives, Green buildings in India, Green building Assessment – Green Building Rating Systems

(BREEAM, USGBC, LEED, IGBC,TERI-GRIHA, GREEN STAR),Criteria for rating, Energy efficient criteria ,environmental benefits economic benefits, health and social benefits, Major energy efficiency areas for building, Contribution of buildings towards Global Warming. Life cycle cost of buildings, Codes and Certification Programs.

UNIT-IV

Design of Green Buildings; Sustainable sites, Impact of construction on environment, Life cycle assessment, Principles of sustainable development in Building Design, Design on Bioclimatic and solar passive architecture, Considerations of energy consumption, water use, and system reliability, indoor air quality, noise level, comfort, cost efficiency in building design, Advanced Green building technologies and innovations

UNIT-V

Construction of Green Buildings: Energy efficient construction, Practices for thermal efficiency and natural lighting. Ecofriendly water proofing; Energy conservation building codes building rating, Maintenance of green buildings, Cost and Performance Comparisons and Benchmarking, Green Project Management Methods and Best Practices, Cost/benefit analysis of green buildings, Life-cycle analysis of green buildings, Case studies of rated buildings (new and existing)

TEXT BOOKS:

1. Alternative Building Materials and Technologies – By K S Jagadeesh, B V Venkata Rama Reddy & K S Nanjunda Rao – New Age International Publishers
2. Integrated Life Cycle Design of Structures – By AskoSarja – SPONPress
3. Non-conventional Energy Resources – By D S Chauhan and S K Sreevasthava – New Age International Publishers
4. Green Buildings (McGraw hill publication): by Gevorkian

REFERENCES:

1. Emerald Architecture: case studies in green buildings, The Magazine of Sustainable Design
2. Understanding Green Building Guidelines: For Students and Young Professionals, Traci Rose Rider, W. W. Norton & Company Publisher.
3. Understanding Green Building Materials, Traci Rose Rider, W. W. Norton & Company Publisher.

Course Outcomes:

The student will be able to:

1. Know the underlying principles, history, environmental and economic impacts of green building technology and to identify the criteria for rating systems along with the established Indian codes and guidelines.
2. Identify various Renewable and Non-renewable sources of energy along with their carbon footprints and comprehend the techniques and benefits of building performance testing such as building modeling and energy analysis, monitoring and metering.
3. Recognize the energy efficient green building materials and explain the cost effective Building Technologies, Strategies for Green Building Systems and Energy Conservation Measures.

4. Explain the application of design guidelines of Green Building considering the Energy Conservation Measures.
5. Summarize on the building codes, relevant legislation governing the consumption of resources and emission of environmental pollutants by buildings and be familiar with IGBC green building certification procedure.

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III Year - II Semester	**3**	**0-0-0**	**3**

ENVIRONMENTAL IMPACT ASSESSMENT
(Open Elective-I)

Course Objectives:

The Students will

1. To impart knowledge on Environmental management and environmental impact assessment.
2. To provide a basic understanding of the EIA process as it is used for research, planning, project or program evaluation, monitoring and regulatory enforcement.
3. To outline the impacts on soil, wetlands, flora, fauna, historical structures and the other socioeconomic environment.
4. To introduce students to the legal, economic, social, administrative and technical process preparing and evaluating environmental impact documents.
5. To assess the air and water quality parameters; predict the impacts and their mitigation measures.

UNIT - I:

Basics concepts of EIA: Initial environmental examination, elements of EIA, factors affecting EIA, impact evaluation and analysis, preparation of environmental base map, classification of environmental parameters.

EIA Methodologies: Introduction, Criteria for the selection of EIA methodology, EIA methods, Ad-hoc methods, matrix methods, network method, Environmental Media Quality Index Method (EMQI), Environmental media quality index method, overlay methods, cost/benefit analysis.

UNIT - II:

Impact of developmental activities and land use: Introduction and methodology for the assessment of soil and groundwater, delineation of study area, identification of of activities. Assessment of impact of developmental activities on vegetation and wildlife, environmental impact of deforestation- causes and effects of deforestation.

UNIT - III:

Procurement of relevant soil quality, impact prediction, assessment of impact significance, identification and incorporation of mitigation measures.

EIA of surface water, air and biological environment: Methodology for the assessment of impacts on surface water environment, air pollution sources, generalized approach for assessment of air pollution impact.

UNIT - IV:

Environmental audit and environmental legislation, objectives of environmental audit, types of environmental audit, audit protocel, stages of environmental audit onsite activities, evaluation of audit data and preparation of audit report, post audit activities.

UNIT - V:

Environmental protection Act, The water Act, The air Act (prevention and control of pollution Act), motor act, wild life act. Case studies of preparation of EIAs for various industries.

Text Books:

1. Environmental impact assessment methodologies, by Y.Anjaneyulu, B.S.Publication, Sultan bazaar Hyderabad.
2. Environmental impact assessment, by Alan Gilpin, Cambridge University Press
3. Environmental pollution Control by Dr. H S Bhatia – Galgotia Publications Pvt Ltd, Delhi.
4. Environmental Impact Assessment and Management Publisher, Daya Author: B Hoisetti, A Kumar

Course Outcomes:

The Students will be able to

1. Explain different methodologies for environmental impact prediction and assessment.
2. Understand the elements of environmental impact assessments and processes by which they apply.
3. Carry out scoping and screening of developmental projects for environmental and social assessments.
4. Evaluate EIA reports.
5. Plan EIAs and environmental management plans

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

ENERGY STORAGE SYSTEMS
(OPEN ELECTIVE - I)

Course Objectives:

The Students will

1. To enable the student to understand the need for energy storage, devices and technologies.
2. To understand the emerging needs for Electric Energy storage
3. To analyze the features of various Energy storage Systems
4. To integrate the Energy storage systems with batteries.
5. To understand the behavior of different configurations of Energy storage Systems

UNIT – I: Electrical Energy Storage Technologies
Characteristics of electricity - The roles of Electric Energy Storage - High generation cost during peak- demand periods - Need for continuous and flexible supply - Long distance between generation and consumption- Congestion in power grids - Transmission by cable

UNIT – II: Needs For Electrical Energy Storage
Emerging needs for Electric Energy Storage – Utilization of more renewable energy - less fossil fuel - Smart Grid uses - The roles of electrical energy storage technologies - The roles from the viewpoint of a utility, from the viewpoint of consumers, from the viewpoint of generators of renewable energy.

UNIT – III: Features of Energy Storage Systems
Classification of Electric Energy Storage systems - Mechanical storage systems - Pumped hydro storage (PHS) - Compressed air energy storage (CAES) - Flywheel energy storage (FES) - Electrochemical storage systems - Secondary batteries - Flow batteries - Chemical energy storage, -Hydrogen (H2) - Synthetic natural gas (SNG).

UNIT – IV: Types of Electrical Energy Storage Systems
Electrical storage systems - Double-layer capacitors (DLC) - Superconducting magnetic energy storage (SMES) - Thermal storage systems - Standards for Electric Energy Storage - Technical comparison of EES technologies.

UNIT – V: Applications
Present status of applications - Utility use (conventional power generation, grid operation & service) - Consumer use (uninterruptable power supply for large consumers) - New trends in applications - Renewable energy generation - Smart Grid - Smart Micro grid, Smart House - Electric vehicles - Management and control hierarchy of storage systems - Internal configuration of battery storage systems - External connection of EES systems - Aggregating EES systems and distributed generation (Virtual Power Plant) - Battery SCADA - Aggregation of many dispersed batteries.

TEXT BOOKS:

1. Energy Storage Benefits and Market Analysis' by James M. Eyer, Joseph J. Iannucci and Garth P. Corey.
2. The Electrical Energy Storage by IEC Market Strategy Board

REFERENCE BOOKS:

1. Jim Eyer, Garth Corey: Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide, Report, Jim Eyer, Garth Corey, Sandia National Laboratories, Feb 2010.

Course Outcomes:

The Students will be able to

1. Understand the concepts of energy storage devices
2. Analyze the characteristics of energy from various sources and need for storage
3. Classify various types of energy storage and various devices used for the purpose
4. Apply the same concepts to real time problems.
5. Differentiate the features of Energy Storage Systems.

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

ENERGY AUDITING, CONSERVATION AND MANAGEMENT
(OPEN ELECTIVE - I)

Course Objectives:
The Students will

1. To understand the need of Energy Audit and Energy Conservation Schemes.
2. To know the necessity of conservation of energy.
3. To generalize the methods of energy management.
4. To illustrate the factors to increase the efficiency of electrical equipment.
5. To detect the benefits of carrying out energy audits.

UNIT-I:Basic Principles of Energy Audit: Energy Audit-
Definitions, Concept, Types of audit, Energy index, Cost index, Pie charts, Sankeydiagrams, Load profiles, Energy conservation schemes- Energy audit of industries- Energy savingpotential, 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 ofharmonics on power factor, Power factor motor controllers - Good lighting system design andpractice, 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 worthmethod, Replacement analysis, Life cycle costing analysis- Energy efficient motors-Calculation ofsimple payback method, Net present worth method- Power factor correction, Lighting -Applications of life cycle costing analysis, Return on investment.

TEXT BOOKS:

1. W.R. Murphy & G. Mckay, “Energy Management”, Butter worth, Heinemann Publications, Second Edition, 2009.
2. Paul o’ Callaghan, “Energy Management”, Tata Mc-Graw Hill Book Company- First Edition, 1998.
3. W.C.Turner, “Energy Management Hand Book”, CRC Press, First Edition, 2004.

REFERENCES:

1. John .C. Andreas, “Energy Efficient Electric Motors”, CRC Press, Third Edition, 1992.
2. Great Britain, “Energy Management and Good Lighting Practice: Fuel Efficiency- Booklet Volume 12-EEO, 1989.

Course Outcomes

The Students will be able to

1. Analyze energy audit of industries.
2. Predict management of energy systems.
3. Sequence the methods of improving efficiency of electric motor.
4. Analyze the power factor and to design a good illumination system.
5. Determine pay back periods for energy saving equipment.

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

AUTOMOTIVE TECHNOLOGY

(OPEN ELECTIVE - I)

Course Objectives:
The Student will

1. Provide an overview on automobile engineering
2. Learn different fuels and advanced control systems
3. Study the concepts and drive train configurations of electric and hybrid electric vehicles
4. Understand use of intelligent vehicle technologies like navigation in automobiles
5. Provide awareness of safety security and regulations

UNIT-I

Structural systems of automobile– chassis and body, power unit, transmission system, Steering System, Suspension System, Braking System.

Other systems of automobile- Ignition systems, Fuel System, Cooling System, Electrical System.

UNIT –II

Fuels: Types of Fuels-Gasoline fuels, CNG, Biofuels, advantages and limitations.

Advanced Engine Controls: Concept of an electronic engine control system, electronic fuel injection - throttle body fuel injection, multi-point fuel injection, gasoline direct injection, common rail direct injection, electronic ignition control.

UNIT –III

Fuel Cell and Solar Vehicles: Fuel cell vehicle – Operating principle, types of fuel cells, fuel cell options for fuel cell vehicle and fuel cell hybrid vehicle. Solar vehicle - Solar photovoltaic cell, solar array, solar car electrical system and drive train.

Electric and Hybrid Vehicles: Electric vehicles - Layout of an electric vehicle, performance, energy consumption, advantage and limitations. Hybrid electric vehicles - Concepts, types of hybrid drive train architecture, merits and demerits.

UNIT-IV

Telematics Systems: Global positioning system, geographical information systems, navigation system.

Comfort Systems: Automotive vision system, adaptive cruise control system, active suspension system, power steering and power windows.

UNIT-V

Safety and Security Systems: Active and passive safety, airbags, seat belt tightening system, collision warning systems, anti-lock braking systems, traction control system, electronic immobilizers, remote keyless entry, smart card system, number plate coding.

Emission and noise control regulations- Pollution standards, National and international – Pollution Control – Techniques – Noise Pollution & control.

TEXT BOOKS:

1. William B Riddens, "Understanding Automotive Electronics", 5th edition, Butter worth Heinemann Woburn,1998.
2. Mehrdad Ehsani, Yimin Gao, Sebastien E. Gay and Ali Emadi, "Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design", CRC Press, 2005.
3. Kripal Singh, "Automobile Engineering", Standard Publishers Distributors, Vol. 1, & Vol. 2, 2007

REFERENCES:

1. Automotive Hand Book" Robert Bosch, SAE, 5th edition, 2000.
2. Ljubo Vlacic, Michel Parent and Fumio Harashima, "Intelligent Vehicle Technologies", Butterworth-Heinemann publications, Oxford, 2001.
3. Iqbal Husain, "Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
4. "Navigation and Intelligent Transportation Systems – Progress in Technology", Ronald K Jurgen, Automotive Electronics Series, SAE, USA, 1998.

Course outcomes:

The student will be able to:

1. Outline the overview of automobile engineering
2. Identify the different fuels and advanced control systems
3. Develop the concepts and drive train configurations of electric and hybrid electric vehicles
4. Apply the use of intelligent vehicle technologies like navigation in automobiles
5. Aware of safety security and regulations

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

MATLAB PROGRAMING LANGUAGE

(Open Elective I)

Course Objectives:

The Student will

1. understand the basic principles of programming and of implementing mathematical concepts in MATLAB.
2. write numerical algorithms with MATLAB Programming language.
3. evaluate the computational results using graphical representations.
4. gain knowledge about advanced MATLAB Programming methods.
5. gain knowledge on Simulink used in MATLAB.

Unit-I : **Introduction To MATLAB**

Historical Background, Applications, Scope of MATLAB, Importance of MATLAB for Engineers, Features, MATLAB Windows (Editor, Work Space, Command History, Command Window).

Operations with Variables, Naming and Checking Existence, Clearing Operations, Commands, Data types, Operators.

Unit-II: **Data Flow in MATLAB**

Vectors, Matrix Operations & Operators, Reshaping Matrices, Arrays, Colon Notations, Numbers, Strings, Functions, File Input-Output, Importing and Exporting of data.

Unit-III: MATLAB Programming

Conditional Statements, Loops, Writing Script Files, Error Correction, Saving Files, Worked out Examples.

Unit-IV: **MATLAB Advanced**

Plotting, Graphics, Creating Plot & Editing Plot, GUI (Graphical User Interface).

Matlab- Algebra, Calculus, Differential, Integration, Polynomials, solving a system of linear equations.

Unit-V: SIMULINK

Introduction, Importance, Model Based Design, Tools, Mathematical Modeling, Converting Mathematical Model into Simulink Model, Running Simulink Models, Importing Exporting Data, Solver Configuration, Masking Block/Model.

TEXT BOOKS:

1. Getting Started With Matlab: A Quick Introduction For Scientists And Engineers (English) by Rudra Pratap, OXFORD University Press.
2. MATLAB Programming by Y. Kirani Singh, B.B. Chaudhuri, PHI Publication.

REFERENCE BOOKS:

1. MATLAB® Programming For Engineers, Fourth edition by Stephen J. Chapman.
2. Applied Numerical Methods Using MATLAB 1st Edition by Won Y. Yang , Wenwu Cao, Tae-Sang Chung, John Morris.

Course Outcomes:

The student will be able to

1. translate mathematical methods to MATLAB code.
2. generalize results and represent data visually.
3. apply computer methods for solving a wide range of engineering problems.
4. utilize computer skills to enhance learning and performance in other engineering and science courses.
5. acquire knowledge of Advanced Matlab programming methods and Simulink.

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

PRINCIPLES OF COMMUNICATIONS

(Open Elective I)

Course Objectives:

The Students will

1. provide the basic concepts of communication systems.
2. gain knowledge about Amplitude modulation and Angle Modulation.
3. study sampling and pulse modulation methods.
4. study and compare different binary digital modulation techniques.
5. understand the basic concepts of information theory.

UNIT – I: Introduction

Block diagram of Electrical communication system, Radio communication: Types of communications, Analog, pulse and digital types of signals, Noise – Types of noise, sources of noise, calculation of noise in Linear systems and noise figure.

UNIT – II: Amplitude Modulation

Need for modulation, Types of Amplitude modulation, AM, DSB SC, SSB SC, Power and BW requirements, generation of AM, DSB SC, SSB SC, Demodulation of AM: Diode detector, Product demodulation for DSB SC & SSB SC. Angle Modulation: Frequency & Phase modulations, advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, Comparison of FM & PM.

UNIT – III: Pulse Modulations

Sampling, Nyquist rate of sampling, Sampling theorem for Band limited signals, PAM, regeneration of base band signal, PWM and PPM, Time Divison Multiplexing, Frequency Division Multiplexing, Asynchronous Multiplexing.

UNIT – IV: Digital Communication

Advantages, Block diagram of PCM, Quantization, effect of quantization, quantization error, Base band digital signal, DM, ADM, ADPCM and comparison. Digital Modulation: ASK, FSK, PSK, DPSK, QPSK demodulation, coherent and incoherent reception, Modems.

UNIT – V: Information Theory

Concept of information, rate of information and entropy, Source coding for optimum rate of information, Coding efficiency, Shanon-Fano and Huffman coding Error control coding: Introduction, Error detection and correction codes, block codes, convolution codes.

TEXT BOOKS:

1. Communication Systems Analog and Digital – R.P. Singh and SD Sapre, TMH, 20th reprint, 2004.
2. Principles of Communications – H. Taub and D. Schilling, TMH, 2003.

REFERENCE BOOKS:

1. Electronic Communication Systems – Kennedy and Davis, TMH, 4th edition, 2004.
2. Communication Systems Engineering – John. G. Proakis and Masoud Salehi, PHI, 2nd Ed. 2004.

Course Outcomes:

The Students will be able to

1. illustrate the main concepts of analogue and digital communication systems.
2. analyze and design an AM and FM modulator/demodulator.
3. explain, discuss, and compare different binary digital modulation techniques.
4. distinguish different types of noise and explain the effects of noise on communication system.
5. use the basic concepts of information theory.

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

DATA BASE MANAGEMENT SYSTEMS

(Open Elective-I**)**

Course objectives:

The Students will:

1. Understanding of the architecture and functioning of database management systems as well as associated tools and techniques.
2. Understand and apply the principles of data modeling using entity relationship and develop a good database design.
3. Understand the use of structured query language (SQL) and its syntax.
4. Apply normalization techniques to normalize a database.
5. Understand the need of database processing and learn techniques for controlling the Consequences of concurrent data access.

UNIT - I:

Introduction to Data base management systems- Data base System Applications, data base System VS file System – View of Data – Data Abstraction –Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor

ER diagrams - Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model

UNIT - II:

Introduction to the Relational Model- Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views.

Relational Algebra- Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

UNIT - III:

Form of Basic SQL Query- Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity‟s – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

Schema refinement- Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.

UNIT - IV:

Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability– Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity.

Recovery and Atomicity- Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.

UNIT - V:

Data on External Storage- File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.

Advanced Database Management System- Introduction to Distributed Database- Reference Architecture, fragmentation, Allocation, Joins

TEXT BOOKS:

1. Data Base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
2. Data base System Concepts, Silberschatz, Korth, McGraw hill, V edition.

REFERENCE BOOKS:

1. Data base Systems design**,** Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems**,** Elmasri Navrate Pearson Education
3. Introduction to Database Systems**,** C.J.Date Pearson Education

Course outcomes:

The Students will be able to:

1. Describe basic concepts of database system.
2. Design a data model and schemas in RDBMS.
3. Use RDBMS for developing industry applications.
4. Be competent in use of structured query language sql.
5. Analyze functional dependencies for designing a robust database

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UGC AUTONOMOUS

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

OPERATING SYSTEMS

(Open Elective-I)

Course objectives:
The Students will :

1. Know the purpose and different types of operating systems.
2. Describe process management and CPU scheduling algorithms.
3. Understand file and directory structures.
4. Understand deadlock prevention and avoidance
5. Explain various memory management and page replacement algorithms.

UNIT - I:

Operating System Overview- Overview of Computer Operating Systems, Operating System Functions, Protection and Security, Distributed Systems, Special Purpose Systems, Operating System Structures, Operating System Services and Systems Calls, Operating Systems Generation.

Process Management- Process Concepts, Threads, Scheduling-Criteria, Algorithms Evaluation, Thread Scheduling.

UNIT - II:

Concurrency- Process Synchronization, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples, Atomic Transactions.

Memory Management- Swapping, Contiguous Memory Allocation, Paging, Page-Table Structure, Segmentation, Virtual Memory, Demand Paging, Page-Replacement Algorithms, Frames Allocation, Thrashing.

UNIT - III:

Principles of Deadlock- System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Introduction to File System- File System Interface, File Concepts, Access Methods and Directory Structure, File System Mounting, File Sharing and Protection.

UNIT - IV:

File System Implementation- File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance. Case Studies: UNIX, Linux and Windows.

Mass Storage Overview- Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Swap-Space Management, RAID Structure, Stable-Storage Implementation, Tertiary Storage Structure.

UNIT - V:

Protection and Security- Goals of Protection, Principles of Protection, Domain of Protection Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems, Language-Based Protection. Security Problem, Program Threats, System and Network Threats Cryptography as a Security Tool, User Authentication, Computer-Security Classifications.

Advanced Operating Systems- Distributed Operating Systems, Multi-Processor Operating Systems, Real-Time Operating Systems and Mobile Operating Systems.

TEXT BOOKS:

1. Operating System Concepts-Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 7th Edition, John Wiley.
2. Operating Systems- a Concept based Approach-D.M.Dhamdhere, 2nd Edition, TMH.

REFERENCE BOOKS:

1. Principles of Operating Systems-Naresh Chauhan, Oxford Higher Education.
2. Operating System A Design Approach-Crowley, TMH.
3. Modern Operating Systems-Andrew S Tanenbaum, 2nd Edition Pearson, PHI.

Course outcomes:

The Students will be able to:

1. Demonstrate the different operating systems.
2. Apply different CPU scheduling algorithms.
3. Analyze different directory structures.
4. Use deadlock prevention and avoidance algorithms
5. Illustrates the behavior of semaphores and monitors.

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

INTRODUCTION TO DATA STRUCTURES
(Open Elective-I)

Course Objectives:
The Students will :

1. Describe the appropriate data structure like linked list to solve problems in real world.
2. Explain the implementation of linear and non linear data structure mechanisms.
3. Discuss the various techniques of tree data structure.
4. Describe graph data structure.
5. Explain several searching and sorting Techniques.

UNIT - I:
Data Structures-Introduction to Data Structures, abstract data types, Introduction to Linear and Non Linear data structures.Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list. Circular linked list implementation, Doubly linked list implementation, insertion, deletion and searching operations. Applications of linked lists.

UNIT - II:
Stacks-Operations, array and linked representations of stacks, stack applications-infix to postfix conversion, postfix expression evaluation. Queues-operations, array and linked representations. Circular Queue operations, Dequeue, applications of queue.

UNIT - III:
Trees – Definition, Binary tree representation, Binary search tree, binary Tree traversals.
AVL tree – operations, Red Black tree.

UNIT - IV:
Graphs-Terminology, sequential and linked representation.
Graph traversals: Depth First Search & Breadth First Search implementation. Spanning trees, Prims and Kruskals method.

UNIT - V:
Searching – Big O Notation, Linear Search and Binary Search.
Sorting-Bubble sort, Insertion Sort, Selection Sort, Merge Sort and Quick sort.

TEXT BOOKS:

1. Data Structures Using C, Reema Thareja, Oxford University Press, 2011 Learning.
2. Introduction to Algorithms, TH Cormen, PHI

REFERENCES BOOKS:

1. Data Structures & Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education.
2. Design methods and analysis of Algorithms, SK Basu, PHI.
3. Fundamentals of Computer Algorithms, 2nd Edition, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Universities Press.

Course Outcomes:

The Students will be able to:

1. Analyze and apply appropriate data structures for solving computing problems.
2. Use linear and non-linear data structures like stacks, queues, trees and graphs.
3. Implement different types of tree data structures.
4. Implement the concepts of graph data structures.
5. Apply the basic searching, sorting Techniques.

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

INTRODUCTION TO WEB DESIGN
(Open Elective-I)

Course Objectives

The Students will :

1. Know regarding internet related technologies.
2. Understanding of the current industry support for web technologies.
3. Explain the basic concepts of CSS.
4. Visualize the basic concepts of PHP.
5. Understanding PHP functions and Methods

UNIT-I

Basics in Web Design: Brief History of Internet, What is World Wide Web, Why create a web site, Web Standards, Audience requirement.

Web Design Principles: Basic principles involved in developing a web site, Planning process , Five Golden rules of web designing, Designing navigation bar ,Page design, Home Page Layout, Design Concept.

UNIT-II

Introduction to HTML: What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags, HTML Tables, HTML Forms.

Elements of HTML: Introduction to elements of HTML, working with Text Working with Lists, Tables and Frames, working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

UNIT-III

Introduction to Cascading Style Sheets: Concept of CSS, Creating Style Sheet and types of CSS, CSS Properties, CSS Styling (Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties).

CSS Advanced (Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Colors, Creating page Layout and Site Designs.

UNIT-IV

Introduction to PHP: Downloading, installing, configuring PHP, The anatomy of a PHP Page. Basic Security Guidelines, Variables, Data Types, Operators and Expressions, Constants, Flow Control Functions; Switching Flow, Loops.

Code Blocks and Browser Output, Objects, Strings Processing, Form processing, Connecting to database, using cookies, dynamic contents.

UNIT-V

Introduction to Web Publishing or Hosting : Creating the Web Site, Saving the site, Working on the web site. Creating web site structure, Creating Titles for web pages, Themes-Publishing web sites.

TEXT BOOKS:

1. Dietel and Dietel : —Internet and World Wide Web - How to Program‖, 5th Edition, PHI/Pearson Education, 2011
2. Web Technologies: HTML,CSS, XML,Php Black Book.

REFERENCE BOOKS:

1. Chris Bates, —Web Programming, building internet applications‖, 2ndEdition, WILEY,
   Dreamtech, 2008.
2. HTML 5 in simple steps Kogent Learning Solutions Inc, Dreamtech Press
3. Beginning CSS: Cascading Style Sheets for Web Design Ian Pouncey, ichard York Wiley India

Course Outcomes:

The Students will be able to:

1. Develop the application of the HTML for document structure.
2. Develop the skills in analyzing the usable of a website.
3. Create dynamic webpage, using PHP.
4. Using PHP to manipulate Files.
5. Develop the concept of web publishing

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

INTERNET OF THINGS
(Open Elective – I)

Course Objectives:
The Students will:

1. Understand the basic building blocks of IoT
2. Analyze the difference between M2M and IoT
3. Introduction of Basics of IoT System Management
4. Extend the knowledge in WSN an IoT enabling technology.
5. Acquire knowledge about challenges of IoT and Identify the specific application of IoT.

UNIT–I:
Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates.

UNIT–II:
Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

IoT and M2M –Difference between IoT and M2M, SDN, NFV, Difference between SDN and NFV.

UNIT–III:
Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER.

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

UNIT-V:
Challenges in IoT
Design challenges, Development challenges, Security challenges, other challenges

Domain specific applications of IoT
Home automation, Industry applications, Surveillance applications, Other IoT applications

Text Books:

1. Internet of Things – A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

Course Outcomes:

The Students will be able to:

1. Analyze the physical and logical design of IoT.
2. Understand the characteristic and communication models of IoT and Compare and contrast M2M and IoT, SDN and NFV
3. Understand the Basics IoT management System
4. Understand the wireless medium issues, MAC protocols, routing protocols
5. Comprehend important challenges of IoT related to design, development and security and Learn about specific application of IoT.

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B. Tech.	**L**	**T-P-D**	**C**
III Year II sem	**3**	**0-0-0**	**3**

INTRODUCTION TO MINING TECHNOLOGY
(OPEN ELECTIVE - I)

COURSE OBJECTIVES:

The Student will:

1. introduce about distribution of mineral deposits in India
2. acquaint with different stages of mining process
3. get idea about Drilling and its machinery
4. get idea about Explosives and blasting in mines
5. know about shaft sinking methods, precaution & lining during shaft sinking

UNIT-I:

Introduction: Distribution of mineral deposits in India and other countries, mining contributions to civilization, mining terminology

UNIT –II:

Stages in the life of the mine - prospecting, exploration, development, exploitation, and reclamation. Access to mineral deposit- selection, location, size and shape (incline, shaft and Adit), brief overview of underground and surface mining methods.

UNIT-III:

Drilling: Types of drills, drilling methods, electric, pneumatic and hydraulic drills, drill steels and bits, drilling rigs, and jumbos.

UNIT-IV:

Explosives: Classification, composition, properties and tests, fuses, detonators, blasting devices and accessories, substitutes for explosives, handling and storage, transportation of explosives.; Rock blasting: Mechanism of rock blasting, blasting procedure, and pattern of shot holes.

UNIT –V:

Shaft sinking: Ordinary and special methods, problems, and precautions, shaft supports and lining.

TEXTBOOKS:

1. R. P. Pal, Rock blasting effect and operation, A. A. Balkema, 1st Ed, 2005.
2. D. J. Deshmukh, Elements of mining technology, Vol. 1, Central techno, 7th Ed, 2001.

REFERENCE BOOKS:

1. 1. C. P. Chugh, Drilling technology handbook, Oxford and IBH, 1st Ed, 1977.
2. 2. R. D. Singh, Principles and practices of modern coal mining, New age international, 1st Ed, 1997.

COURSE OUTCOMES:

The student will be able to:

1. Learn about distribution of mineral deposits in India
2. Learn about stages on mining process
3. Learn about drilling and its machinery
4. Understand about explosives, blasting and blasting mechanism
5. Understand about shaft sinking methods, precautions and lining of shafts

Open Elective - II

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

WASTE MANAGEMENT
(Open Elective-II)

Course Objectives:

The Students will:

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

UNIT - I:

Introduction

Definition of solid waste, garbage, rubbish-Sources and Types of solid wastes Municipal waste, industrial waste, plastic waste, electronic waste, bio-medical waste and hazardous waste - Characteristics of Solid Wastes: Physical, chemical and biological characteristics-Problems due to improper disposal of solid waste.

UNIT II:

Functional Elements of Solid Waste Management

Waste generation and handling at source-onsite storage-Collection of solid wastes Collection methods and services-storage of solid waste- guidelines for collection route layout.

UNIT - III: Transfer and Transport of Wastes

Transfer station-types of vehicles used for transportation of solid waste-Processing and segregation of the solid waste- various methods of material segregation.

Processing and Transformation of Solid Wastes

Recycling and recovery principles of waste management- Composting: definition methods of composting-advantages of composting- Incineration: definition methods of incineration advantages and disadvantages of incineration.

UNIT - IV: Treatment and Disposal of Solid Waste

Volume reduction, Open dumping, land filling techniques, Landfills: classification Design and Operation of landfills, Land Farming, Deep well injection.

UNIT - V: Waste Minimization

Introduction to waste minimization, waste minimization techniques-5R (refuse, reduce, reuse, recover, recycle), municipal waste minimization, industrial waste minimization.

Text Books:

1. Solid and hazardous waste management by M.N.Rao and Razia sultana, BS publications
2. Environmental Engineering by Howard S.Peavy, Donald R.Rowe and George Tchobanognous

Reference Books:

1. Integrated Solid Waste Management by Tchobanognous.
2. Environmental engineering by Y.Anjaneyulu, B.S publication.
3. Environmental Pollution Control Engineering by C.S. Rao; Wiley Eastern Ltd., New Delhi.
4. Environmental engineering by Gerad Kiley, Tata Mc Graw Hill

Course Outcomes:

Students will be able to

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

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

ESTIMATION, QUANTITY SURVEY & VALUATION
(Open Elective-II)

Course Objective

The Students will:

1. Understand how to estimate the quantities of work, develop the bill of quantities and arrive at the Cost of civil engineering Project
2. Estimate the detailed quantities of various items of work and their rates in building projects.
3. Estimate the quantities of works and evaluate cost of project.
4. Understand and apply the concept of Valuation for Properties
5. Understand, Apply and Create the Tender and Contract document.

UNIT - I:

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

UNIT II:

Detailed Estimates of Buildings - Reinforcement bar bending and bar requirement schedules

UNIT - III:

Earthwork for roads and canals.

UNIT - IV:

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

UNIT - V:

Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation - Standard specifications for different items of building construction.

Text Books:

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and Costing by G.S. Birdie.

Reference Books:

1. Standard Schedule of rates and standard data book by public works department.
2. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)
3. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.

Course Outcomes:

The Students will be able to

1. Prepare detailed and abstract estimates for buildings, roads and canals
2. Prepare valuation of buildings.
3. Interpret Contract document of for civil engineering works
4. To study on Valuation of buildings, Standard specifications for different items building construction
5. Formulate construction scheduling and project Management methods.

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

ELECTRIC AND HYBRID VEHICLES
(OPEN ELECTIVE - II)

Course Objectives:
The Student will

1. understand working of different configurations of electric vehicles, and its components
2. understand hybrid vehicle configuration and performance analysis.
3. Introduce the transmission configuration and its analyze the characteristics
4. analyze the different speed control techniques
5. design and evaluate the sizing of components in hybrid vehicles.

UNIT-I : ELECTRIC VEHICLES
Introduction to Electric Vehicles – History of Electric and Hybrid Vehicles - Components - vehicle mechanics - Roadway fundamentals - vehicle kinetics - Dynamics of vehicle motion - Propulsion System Design.

UNIT-II : BATTERIES
Basics - Types - Parameters - Capacity - Discharge rate - State of charge - state of Discharge - Depth of Discharge - Technical characteristics - Battery pack Design - Properties of Batteries.
Fuel Cells - Types - Fuel Cell Electric Vehicle.

UNIT-III: DC & AC ELECTRICAL MACHINES
(Speed control Techniques)
Motor and Engine rating – Requirements – Speed control techniques of DC machines in Electric Vehicles – Speed control techniques of Three phase A/c machines -Induction machines- Permanent Magnet Machines, Switched Reluctance Machines.

UNIT-IV: ELECTRIC VEHICLE DRIVE TRAIN
Transmission configuration - Components - gears, differential, clutch, brakes regenerative braking- motor sizing- Gear Ratio – Torque speed characteristics - EV Motor Sizing Initial Acceleration - Rated Vehicle Velocity - Maximum Velocity - Maximum Gradability.

UNIT-V: HYBRID ELECTRIC VEHICLES
Types of Hybrid Vehicles - series and parallel Hybrid Electric Vehicles, series- parallel configuration - Internal Combustion Engines - Reciprocating Engines - Practical and Air-Standard Cycles - Air-Standard Otto Cycle - Air-Standard Diesel Cycle - Example IC Engines in HEVs - Design - Drive train - sizing of components.

TEXT BOOKS:

1. Iqbal Hussain, “Electric & Hybrid Vehicles - Design Fundamentals”, Second Edition, CRC Press, 2011
2. James Larminie, “Electric Vehicle Technology Explained”, John Wiley & Sons, 2003.

REFERENCES:

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi, “Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals”, CRC Press, 2010.

2. Sandeep Dhameja, “Electric Vehicle Battery Systems”, Newnes, 2001

Course outcomes:

The student will be able to:

1. Understand the working of different configurations of electric vehicles, hybrid vehicles and its components.
2. Apply the basic concepts of batteries and Motors in the design of Electric and Hybrid Vehicles.
3. Differentiate the modes of operation of Hybrid Vehicles.
4. Analyze the performance of hybrid vehicles.
5. Design the basic parameters of Electric and Hybrid Electric Vehicles.

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

MATERIALS IN ELECTRICAL SYSTEMS
(OPEN ELECTIVE - II)

Course Objectives:
The Student will

1. understand the importance of various materials used in electrical engineering
2. obtain a qualitative analysis of their behavior and applications.
3. analyze the process used in manufacturing of integrated circuits
4. perform the calculations on cables on various aspects
5. evaluate the characteristics of HV and EHV cable.

UNIT-I : Materials
Conductors-free electron theory and electron scattering Di electrics Polarization, solid, liquid and gas dielectrics Insulators-Classification, Application in electric devices.

UNIT-II : Magnetic materials
Classification based on orientation of magnetic dipoles, Optoelectronic materials, Semiconductors-simple and compound, Refractory Materials. Solders and contacts, Super conductivity and super conducting materials.

UNIT-III: Components
Resistors and Capacitors. Display units:-LED, LCD and Monitors. Effect of environment on components.

UNIT-IV: Processes
Basic processes used in the manufacture of integrated circuits such as Epitaxy, masking, photolithography, diffusion, oxidation, Etching, metallization, Scribing, wire bonding and Encapsulation. Induction and Dielectric heating. Electron beam welding and cutting..

UNIT-V: Cables
Calculations of capacity of cables, charging current, stress, grading, heating of cables, Construction and characteristics of HV & EHV cable

TEXT BOOKS:

1. S.O. Kasap, Principles of Electrical Engineering Materials," MGH.
2. Mahajan, Principles of growth and processing of semiconductors," MGH.
3. Decker, Electrical Engineering Materials," PHI.

REFERENCES:

1. Dhir, Electronic components and Materials Principles manufacturing and Maintenance," TMH.
2. Allison, „Electronic Engineering Materials and Devices," TMH.
3. Ruska N Scot, Microelectronic processing – an introduction to the manufacture of integrated circuits," MGH.

Course outcomes:

The student will be able to:

1. Understand various types of materials and their properties in various conditions.
2. Evaluate magnetic materials and their behavior.
3. Evaluate semiconductor materials and technologies.
4. Acquire Knowledge on Materials used in electrical engineering and applications.
5. Design the components and observe the effect of these components on environment.

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B. Tech.	**L**	**T-P-D**	**C**
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FUNDAMENTALS OF OPERATIONS RESEARCH

Open Elective - II

Course Objectives:
The Student will

1. Get the basic knowledge of formulation, Solve the LPP models using graphical and mathematical applications.
2. Identify the optimal way of developing various transport models, Choose the appropriate assignment of men and machinery to perform various tasks
3. Understand the optimal sequencing for a machine or for a job when there are m machines and n jobs; understand the concept of replacing machine at the appropriate
4. Understand the strategies in the business environment and decide the strategy to get maximum value of the game. Understand the inventory in an industry or business organization and its importance.
5. Define waiting time at any point to get the desired service for a single channel service and multi-channel service.

UNIT – I Introduction - Development – Definition– Characteristics and Phases – Types of models – Operations Research models – applications.

Allocation: Linear Programming Problem - Formulation – Graphical solution – Simplex method – Artificial variables techniques: Two–phase method, Big-M method; Duality Principle.

UNIT – II

Transportation problem – Formulation – Optimal solution, unbalanced transportation problem – Degeneracy.

Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem; Traveling Salesman problem

UNIT – III

Sequencing – Introduction – Flow **–**Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines

Replacement: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely-Group Replacement.

UNIT – IV

Theory of games: Introduction –Terminology– Solution of games with saddle points and without saddle points- 2 x 2 games –m x 2 & 2 x n games - graphical method – m x n games - dominance principle.

UNIT – V

Waiting lines: Introduction – Terminology-Single Channel – Poisson arrivals and Exponential Service times – with infinite population and finite population models– Multichannel – Poisson arrivals and exponential service times with infinite population.

Simulation: Definition – types of simulation models- applications, advantages and disadvantage. Brief introduction of simulation languages – inventory and queuing problems using random numbers

TEXT BOOKS:

1. Operation Research/J. K. Sharma /Mac Milan.
2. Introduction to O.R/Hillier & Libermann (TMH).

REFERENCES:

1. Operations Research: Methods and Problems / Maurice Saseini, Arhur Yaspanand Lawrence Friedman
2. Operations Research /A. M. Natarajan, P. Balasubramaniam, A. Tamilarasi / Pearson Education
3. Operations Research / Wagner/ PHI Publications.
4. Operations Research / ACS Kumar/Yesdee

Course outcomes:

The student will be able to:

1. Allocate and distribute material, machine, man hour, money and number of men in any service and manufacturing industry.
2. Allot optimum quantities to various destinations from different sources with minimum cost. Assign the required men and machines to perform the given tasks.
3. Determine the number of items to be produced and the product mix. Schedule and sequence production runs by proper allocation of machines and men to get maximum gain or profit.
4. Compute the economic order quantity in different scenario to minimize inventory cost. Determine the quantity to be ordered when there are quantity discounts on the price.
5. Determine the number of service channels required to keep minimum waiting time at optimum service cost. Determine the shortest path for a given route and to solve the inventory and capital management problems.

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IV Year - I Semester	**3**	**0-0-0**	**3**

(F41OF) Digital Systems Using VHDL

(Open Elective -II)

COURSE OBJECTIVES

The Students will:

1. Learn how a Hardware Description Language (HDL) is used to describe and implement hardware.
2. Learn how to simulate and test that hardware and optimise their designs.
3. Learn in-depth study of combinatorial and sequential hardware systems and the use of finite state machines in the design of sequential systems.
4. To understand concept of Programmable Devices, PLA, PAL, CPLD and FPGA and implement digital system using VHDL.
5. To implement combinational and sequential circuits using VHDL.

UNIT I

Review of Logic Design Fundamentals: Combinational Logic, Boolean Algebra and Algebraic Simplification, Karnaugh maps, Designing with NAND and NOR Gates, Hazards in Combinational Networks, Flip-flops and latches, Mealy Sequential Network, Equivalent States and reduction of State Tables, Sequential Network Timing, Setup and Hold Times, Synchronous Design, Tristate Logic and Buses.

UNIT II

Introduction to VHDL: VHDL Description of Combinational Networks, Modeling Flip-flops using VHDL Process, VHDL Models for a Multiplexer, Compilation and Simulation of VHDL Code, Modeling a Sequential Machine, Variables, Signals and Constants, Arrays, operators, Functions, Procedures, Packages and Libraries, VHDL Model for a 74163 Counter.

UNIT III

Designing with Programmable Logic Devices: Read-Only Memories, Programmable Logic Arrays (PLAs), Programmable Array Logic (PALs) , Other Sequential Programmable Logic devices(PLDs),Design of a Keypad Scanner.

Design of Networks for Arithmetic Operations: Design of a Serial Adder with Accumulator, State Graphs for Control Networks, Design of a Binary Multiplier, Multiplication of Signed Binary Numbers, Design of a Binary Divider.

UNIT IV

Digital Design with SM Charts: State Machine Charts, Derivation of SM Charts, Realization of SM Charts, Implementation of the Dice Game, Alternative Realizations for SM Charts using Microprogramming, Linked State Machine.

Designing with Programmable gate Arrays and Complex Programmable Logic Devices: Xilinx 3000 Series FPGAs, Designing with FPGAs, Xilinx 4000 Series FPGAs, Using a One-Hot

State Assignment, Altera Complex Programmable Logic Devices(CPLDs),Altera FLEX 10K Series CPLDs.

UNIT V

Floating-Point Arithmetic: Representation of Floating-Point Numbers, Floating-point Multiplication, Other Floating-Point Operations.

Hardware Testing and Design for Testability: Testing Combinational Logic, Testing Sequential Logic, Scan Testing, Boundary Scan, Build-In Self-Test**.**

TEXTBOOKS:

1. Charles H,Roth ,“Digital system design using VHDL” , 2nd Edition, PWS publishing co.
2. Zainalabedin Navabi, “VHDL analysis and modeling of digital systems”,2nd Edition, MGH, 2004.

REFERENCE BOOKS:

1. Stphen Brown, "Fundamental of Digital logic with VHDL Design", Tata McGraw Hill, 2008.
2. J.Bhaskar ,“A VHDL primer”,3rd edition 2004, Prentice Hall of India Limited.
3. Michael D.Ciletti, “Advanced Digital design with Verilog HDL”, 2nd Edition, PHI Ltd, 2005.

COURSE OUTCOMES

The Students will be able to:

1. develop a digital logic and apply it to solve real life problems.
2. practice combinational and sequential digital circuits using different styles of modeling of VHDL.
3. analyze, design and implement sequential logic circuits.
4. employ digital system design using PLD.
5. simulate and implement combinational and sequential circuits using VHDL systems.

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(F41OG) IC TECHNOLOGY

(Open Elective -II)

COURSE OBJECTIVES:

The Student will

1. understand the basic building blocks of linear and digital integrated circuits.
2. Familiarize with op-amp applications of active filters and oscillators.
3. gain the theory about applications of analog multipliers and PLL.
4. demonstrate the working of ADC and DAC.
5. understand few special functionalities of combinational and sequential integrated circuits.

UNIT I: INTEGRATED CIRCUITS

Classification, Chip Size and Circuit Complexity, Ideal and Practical Op-Amp, Op-amp characteristics-DC and AC Characteristics, 741 Op-Amp and its Features, Concept of Virtual Ground ,Modes of operation-inverting, non-inverting, differential.

UNIT II: OP-AMP APPLICATIONS

Basic Applications of Op-Amp, Instrumentation Amplifier, AC Amplifier, V to I and I to V Converters, Sample & Hold Circuits, Differentiators and Integrators, Comparators, Schmitt Trigger, Multivibrators.

UNIT III: ACTIVE FILTERS & OSCILLATORS

Introduction, First Order and Second Order Low Pass, High Pass and Band Pass Filters, Active Band Reject and All Pass Filters.

Principle of Operation and Types of Oscillators – RC, Wien Bridge and quadrature type. Waveform Generators – Triangular, Saw Tooth, Square Wave.

UNIT IV: TIMERS & PHASE LOCKED LOOPS

Introduction to 555 Timer, Functional Diagram, Monostable and Astable Operations and Applications, Schmitt Trigger, PLL - Introduction, Block Schematic, Principles and Description of Individual Blocks of 565, VCO. Introduction to Voltage Regulators, Features of 723 Regulator.

UNIT V: D-A AND A- D CONVERTERS

Introduction, Basic DAC Techniques - Weighted Resistor Type, R-2R Ladder Type, Inverted R-2R Type. Different types of ADCs – Parallel Comparator Type, Counter Type, Successive Approximation Register Type and Dual Slope Type. DAC and ADC Specifications.

TEXT BOOKS:

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 3rd Ed., 2008.
2. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 1987.

REFERENCE BOOKS:

1. Modern Digital Electronics – RP Jain – 4/e – TMH, 2010.
2. Op-Amps and Linear Integrated Circuits – Concepts and Applications by James M.Fiore, Cengage/ Jaico, 2/e, 2009.
3. Operational Amplifiers and Liner Integrated Circuits by K.Lal Kishore – Pearson, 2008.

COURSE OUTCOMES:

The Student will be able to:

1. model operational amplifiers with linear and digital integrated circuits.
2. design op amp as active filters and oscillators.
3. reconstruct and relate circuits using operational amplifiers for various applications.
4. examine OP Amp to work as a converter.
5. design special function integrated circuits.

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COMPUTER NETWORKS

(Open Elective-II)

Course objectives:
The Students will :

1. Recognize various layering approaches for networking and understand the functionalities of physical layer.
2. Identify the data link layer protocols, multi access protocols, Ethernet technologies and various internetworking devices.
3. Examine design issues of network layer, services provided to above layer and routing, and congestion control protocols.
4. Examine IP protocol, addressing, various protocols like CIDR, ICMP,ARP and RARP of internet Layer and examination of transport layer services.
5. Examine Transport layer protocols like TCP, UDP, RPC and various congestion controlling mechanisms, including application layer services, protocols like HTTP, FTP, E-Mail etc.

UNIT - I:
Overview of the Internet: Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparison of the OSI and TCP/IP reference model.
Physical Layer: Guided transmission media, wireless transmission media.

UNIT - II:
Data Link Layer: design issues, Framing, Error Detection and Error Correction, Block Coding, Hamming Distance, CRC, Flow control and error Control.
Protocols: Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols..
Connecting Devices: Repeaters, Hubs, Switches, Gateways and **Bridges -** Learning and Spanning tree bridges.
Multi Access protocols- Random access - . ALOHA, CSMA, CSMA/CD and CSMA/CA, Controlled access, Channelization. Ethernet IEEE 802.3, IEEE 802.5, IEEE 802.11

UNIT - III:
Network Layer: Network layer design issues, Store and forward packet switching, connection less and connection oriented network services.
Internetworking: Protocols-IPV4 and IPV6**,** Logical Addressing-IPV4, IPV6, Tunnelling and Packet Fragmentation.
Address Mapping: ARP, RARP, DHCP, ICMP and IGMP.

Routing Algorithms: Shortest Path Finding and Distance Vector Routing Algorithms.

UNIT - IV:
Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), The TCP Connection Establishment, The TCP Connection Release, Crash recovery, The TCP sliding window, The TCP congestion control, Improving Quality of Service Techniques: Leaky Bucket Algorithm.

UNIT - V:

Application Layer: Introduction, services, Application layer paradigms.

Applications: DNS, WWW, HTTP, FTP, E-MAIL, TELNET, SNMP, SSH.

TEXT BOOKS:

1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.

REFERENCES BOOKS:

1. "Computer Networks", 5E, Peterson, Davie, Elsevier
2. "Introduction to Computer Networks and Cyber Security", Chawan - HwaWu, Irwin, CRC Publications.
3. "Computer Networks and Internets with Internet Applications", Comer .

Course outcomes:

The Students will be able to:

1. Demonstrate the networking concepts, various Layering approaches and their functionalities.
2. Understand the protocols of Data Link layer, how a medium can be shared among multiple devices, Ethernet technologies and internetworking devices used.
3. Work on fragmentation, assigning of logical address and judge on routing, congestion.
4. Demonstrate the working of IP Protocol, other protocols of internet layer and services of transport layer.
5. Explain the transport layer and application layer protocols, their working.

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PYTHON PROGRAMMING

(Open Elective-II)

Course objectives:

The Students will :

1. Learn how to design and program Python applications.
2. Learn how to use lists, tuples, and dictionaries in Python programs.
3. Learn how to identify Python object types, Components, decision statements, pass arguments in Python.
4. Learn how to build and package Python modules for reusability, design object oriented programs with Python classes, use class inheritance in Python for reusability.
5. Learn how to use exception handling in Python applications for error handling

UNIT - I:

Programming paradigms; Structured programming vs object oriented programming, OOPs fundamentals- class, object, abstraction, encapsulation, polymorphism, and inheritance; Introduction to Python Getting started to Python- an interpreted high level language, interactive mode and script mode. Variables, Expressions and Statements Values and types, Variables and keywords, statements, evaluating expressions, operators and operands, order of operations, composition. Functions function calls, type conversion, type coercion, pre-defined functions, composition, user define functions, flow of execution, passing parameters, function parameters and scope. Conditionals and recursion modulus operator, Boolean expression, logical operators, conditional execution, alternative execution, chained and nested conditionals, return statement; Recursion, infinite recursion.

UNIT - II:

Python data structures Strings Creating, initializing and accessing the elements; String operators, comparing strings using relational operators; String functions and methods. **Lists:** Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements; List operations; List functions and Methods, list parameters, nested lists, Matrices.

Dictionaries

Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, dictionary operations traversing, appending, updating and deleting elements, Dictionary functions and methods.

Tuples

Mutability and tuples, Immutable concept, creating, initializing and accessing the elements in a tuple, Tuple functions.

UNIT - III:

Object oriented programming using Python: creating python classes, classes and objects: user defined compound types, attributes, instances as arguments, instances as return values, objects are mutable, copying; classes and functions: pure function, modifiers; Exceptions: raising exceptions, handling exceptions, exception hierarchy.

UNIT - IV:

Classes and methods: object oriented features, optional arguments, initialization method, operator overloading and polymorphism. Inheritance: Basic Inheritance: extending built-ins, overriding and super; Multiple inheritance: the diamond problem, different sets of arguments.

UNIT - V:

Files handling and Exceptions: Text files, writing variables, Directories, Pickling;
Database Programming in Python: Connection module, connect MySQL Data base, perform DDL, DML and DQL operations.

Text Books:

1. **Python 3 Object Oriented Programming,** Dusty Phillips, Packet Publishing, 2010.
2. **Programming in Python 3** - A complete Introduction to the Python Language-Second Edition, Mark Summerfiels, Addison-Wesley 2010.

Reference Books:

1. **Programming Python- 4th Edition**, Mark Lutz, O'Reilly, 2011.
2. **Object-Oriented Programming in Python**, Michael H, Goldwasser, David Letscher, Pearson Prentice Hall, 2008.

Course outcomes:

The Students will be able to:

1. Describe to design and program Python applications.
2. Analyse and conversion of to use lists, tuples, and dictionaries in Python programs.
3. Explain the concept to identify Python object types, Components ,decision statements, pass arguments in Python.
4. Apply decision for building and package Python modules for reusability, design object-oriented programs with Python classes, use class inheritance in Python for reusability.
5. Apply file handling and Exception handling Concepts in real world using python

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COMPUTER ORGANIZATION
(Open Elective-II)

COURSE OBJECTIVES:

The Students will :

1. understand the basic operations of the computer system.
2. know the functioning of CPU and the control unit
3. analyze various algorithms for arithmetic operations in the computer.
4. understand different hierarchical memory systems including cache memory and virtual memory.
5. Recognize different ways of communicating with input/output devices and standard I/O interfaces.

UNIT-I :

Basic structures of Computers: Computer Types, Functional unit, Basic operational concepts, Bus structures, software, Performance, multiprocessors and multi computers.
Data Representation: Fixed point representation, Floating point representation, Error detection codes.

UNIT-II:

Register Transfer and Micro operations: Register transfer language, Register transfer, Bus and memory transfers, Arithmetic micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.
Basic computer organization and Design: Instruction codes, computer registers, computer instructions, Timing and control, instruction cycle.

UNIT-III:

Computer Arithmetic: Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-point arithmetic operations, Decimal arithmetic unit, Decimal arithmetic operations.

UNIT-IV:

The Memory System: Basic concepts, Semiconductor RAM memories, Read-Only memories, speed, Size and Cost, Cache memories, performance considerations, Virtual memories, Secondary storage.

UNIT-V:

Input/output Organization: Accessing I/O Devices Interrupts, Interrupt hardware, Enabling and disabling interrupts, Direct memory access, Buses, interface circuits, Standard I/O interfaces.

TEXT BOOKS:

1. ComputerOrganization-CarlHamacher,ZvonkoVranesic,SafwatZaky,VthEdition,McGraw Hill.
2. Computer System Architecture-M.Moris Mano, IIIrd Edition, Pearson/PHI

REFERENCE BOOKS:

1. Computer organization and architecture-William stallings, Sixth Edition, Pearson/PHI
2. Structures Computer Organization-Andrew S.Tanebaum,4th Edition PHI/Pearson.

COURSE OUTCOMES:

The Students will be able to:

1. Illustrate basic operations of the computer system.
2. Apply knowledge of CPU and the control unit.
3. Apply various algorithms for arithmetic operations in the computer.
4. To classify different memory systems.
5. Produce knowledge on input/output organization.

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HUMAN COMPUTER INTERACTION
(Open Elective-II)

Course Objectives:
The Students will :

1. Demonstrate an understanding of guidelines, principles, and theories influencing human computer interaction.
2. Recognize how a computer system may be modified to include human diversity.
3. Select an effective style for a specific application.
4. Design mock ups and carry out user and expert evaluation of interfaces.

UNIT I
Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design, The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT II
Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT III
Screen Designing:- Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT IV
Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT V
Software tools – Specification methods, interface – Building Tools. Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

TEXT BOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson Education Asia

REFERENCE BOOKS:

1. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.

Course Outcomes:

The Students will be able to:

1. Explain the human, Computer components functions regarding interaction with computer
2. Demonstrate Understanding of Interaction between the human and computer components.
3. Use Paradigms, HCI in the software process.
4. Implement Interaction design basics.

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INTRODUCTION TO EMBEDDED SYSTEMS

(OPEN ELECTIVE-II)

Course Objectives:

The Students will:

1. Understand the basic concepts of embedded systems and 8051 microcontrollers.
2. Compare and contrast the basics of assembly programming language.
3. Identify the unique characteristics of real-time systems
4. Analyze the general structure of a real-time system and define the unique design problems and challenges of real-time systems.
5. Acquaint the embedded software development tools and various advanced architectures.

UNIT–I:

Embedded Computing: Introduction, complex systems and microprocessor, the embedded system design process, formalisms for system design, design examples.

UNIT–II:

The 8051 Architecture: Introduction, 8051 micro controller hardware, input/outputports and circuits, external memory, counter and timers, serial data input/output, interrupts.

Basic Assembly Language Programming Concepts: The assemblylanguage programming process, programming tools and techniques, programming the 8051. Data transfer and logical instructions, arithmetic operations, decimal arithmetic, jump and call instructions.

UNIT–III:

Introduction to Real-Time Operating Systems: Tasks and task states, tasks and data, semaphores, and shared data; message queues, mailboxes and pipes, timer functions, events, memory management, interrupt routines in an RTOS environment.

Basic Design Using a Real-Time Operating System: Principles, semaphores and queues, hard real-time scheduling considerations, saving memory and power, an example RTOS like uC-OS (open source).

UNIT–IV:

Embedded Software Development Tools: Host and target machines, linker/locators for embedded software, getting embedded software into the target system

Debugging Techniques: Testing on host machine, using laboratory tools, an example system.

UNIT-V:

Introduction to advanced Architectures: ARM and SHARC, processor and memory organization and instruction level parallelism; networked embedded systems: bus protocols, I^2C bus and CAN bus; internet-enabled systems, design example-elevator controller.

Text Books:

1. Wayne Wolf (2008), Computers as Components-principles of embedded computer system design, Elseveir, New Delhi, India.
2. Kenneth J. Ayala (2008), The 8051 Microcontroller, 3rd edition, Cengage Learning, India.

References:

1. David E. Simon (1999), An Embedded Software Primer, Pearson Education, India.
2. Jean J. Labrosse (2000), Embedding System Building Blocks, 2nd edition, CMP publishers, USA.
3. Raj Kamal (2004), Embedded Systems, Tata McGraw hill, India.

Course Outcomes:

The Students will be able to:

1. Program an embedded system
2. Analyze Interfacing with keyboard, A/D & D/A conversions, serial data Communication, LCD and LED display.
3. Illustrate Tasks, Semaphores, Message queues, pipes, Timer functions.
4. Design embedded systems and real-time systems
5. Compare and contrast ARM, SHARC, internet enabled systems.

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INTRODUCTION TO SURFACE MINING

(OPEN ELCTIVE II)

COURSE OBJECTIVES:

1. To introduce surface mining terms and applicable conditions
2. To acquaint with different machinery used in surface mining
3. To get idea about Drilling and blasting of surface ore bodies.
4. To get idea about lighting, dust and slopes in surface mines.
5. To know about ore and waste transportation.

UNIT-I: Definition, Terminology, Applicability and limitations of surface mining, Classification, Advantages and dis-advantages of surface mining.

UNIT-II : Introduction to surface mining machinery: Equipment selection; Working with rippers, shovels, draglines, shovel-dragline combination; bucket wheel excavator. Disposal of OB/waste material

UNIT-III:

Drilling & blasting**:** Drilling mechanism, drilling patters, Drill bits Explosives, Blasting accessories, Bulk explosives, problems in blasting.

UNIT-IV: Basics of Mine lighting, Sources of dust in surface mining, dust control, and slope stabilization

UNIT-V: Methods of excavation & transportation – shovel-dumper combination, draglines, surface miner, bucket wheel excavator. Impacts on environment due to surface mining

TEXTBOOKS:

1. D.J. Deshmukh, Elements of Mining Technology, Vol 1, Central Techno, 7th Edition, 2001.
2. Principles & Practices of Coal Mining, R.D. Singh

REFERENCE BOOKS

1. Surface Mining Technology, by Prof S.K.Das, Lovely Prakashan, Dhanbad

COURSE OUTCOMES:

The student will be able to:

1. Understand about surface mining terms and conditions of applicability
2. Learn about different machinery used in surface mining
3. Learn drilling and blasting in surface mining
4. Understand mine lighting, dust and slopes in surface mining
5. Understand the transportation of ore and waste in surface mining.

Open Elective - III

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ELEMENTS OF CIVIL ENGINEERING
(Open Elective-III)

Course Objectives:

The Students will

1. understand different methods of surveying for various applications.
2. familiarize with various types of building materials.
3. understand transportation and traffic management.
4. Gain knowledge of water sources, supply& its treatment.
5. Study about Highway development in India, Necessity for Highway planning, different road development plans.

UNIT - I:

Introduction, history of the civil engineering, sub – disciplines of civil engineering.

UNIT II:

Surveying

Introduction, divisions of surveying, classification of surveying, principles of surveying. Linear measurements and errors–introduction, methods of linear measurements, chaining instruments, types of error and correction. Compass surveying – introduction, angular measurement using compass, whole circle bearing and reduced bearing, fore bearing and back bearing. Traverse surveying –introduction, chain and compass traversing, closing error and adjustments. Levelling– introduction, types of levelling instruments, dumpy level, adjustment of level, levelling staff.

UNIT - III:

Building Materials and Construction

Materials: Introduction to construction materials like ferrous and nonferrous metals, alloys, Stones, Bricks, Lime, Cement, Timber, Sand, Aggregates, Mortar, Concrete and bitumen. Construction: Types of building, different loads considered in building design, types of foundation in building, other developments and constructions of buildings.

UNIT - IV:

Fire and Earthquake Protection in Building Introduction, fire protection in building, structural and architectural safety requirements of resistive structures, fire resistive properties of building materials, fire exit requirements, force and acceleration on building due to earthquake, building response characteristics, building drift.

UNIT - V:

Water Supply, Sanitary and Electrical Works in Building

Introduction, water supply system, water supply layout of a building, house drainage, traps, electrical works in building.

Highway Engineering:

Introduction, historical background of road or highway, classification of roads, pavements and roads, traffic control mechanism.

TEXT BOOKS:

1. Elements of Civil Engineering Author: Mimi Das Saikia, Bhargab Mohan Das and Madan Mohan Das Publisher: PHI Learning Private Limited New Delhi.
2. Elements of Civil Engineering Author: Dr. R.K. Jain and Dr. P.P. Lodha Publisher: McGraw Hill Education, India Pvt. Ltd.
3. Surveying Vol. I Author: Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain16th Edition Publisher: Laxmi Publication Delhi.
4. Building drawing Author: M.G.Shah, C.M.Kale and S.Y.Patki Publisher: Tata McGraw Hill.

Reference Books:

1. Surveying Theory and Practice (7th Edition) Author: James M Anderson and Edward M Mikhail Publisher: McGraw Hill Education, India Pvt. Ltd.
2. Surveying and Leveling Author: R. Subramanian Publisher: Oxford University.
3. Building drawing Author: M.G.Shah, C.M.Kale and S.Y.Patki Publisher: Tata McGraw Hill.
4. Civil Engg. Drawing Author: S. C. Rangwala Publisher: Charotar Pub. House Anand.

Course Outcomes:

Students will be able to

1. Carry out simple land survey and prepare maps showing the existing details.
2. Find out area of irregular shaped plane areas.
3. Understand building plan, elevation and section.
4. Get acquainted with construction materials and transportation systems.
5. Understand transportation and traffic problems.

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DISASTER MANAGEMENT
(Open Elective-III)

Course Objectives:

The Student will:

1. provide basic conceptual understanding the difference between the hazard and a disaster.
2. gain knowledge about the various disasters and their impacts.
3. provide basic understanding about the hazard and vulnerability profile of India.
4. have conceptual understanding about the disaster management phases.
5. gain approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, Disasters, disaster prevention and risk reduction.

UNIT - I:

Concept of Disaster, Different approaches ,Concept of Risk, Levels of Disasters ,Disaster Phenomena and Events (Global, national and regional) ,Hazards and Vulnerability, Natural and man-made hazards, response time, frequency and forewarning levels of different hazards, Characteristics and damage potential or natural hazards, hazard assessment ,Dimensions of vulnerability factors, vulnerability assessment Vulnerability and disaster risk ,Vulnerabilities to flood and earthquake hazards.

UNIT II:

Disaster Management Mechanism, Concepts of risk management and crisis managements. Disaster Management Cycle, Response and Recovery Development, Prevention, Mitigation and Preparedness ,Planning for Relief.

UNIT - III:

Capacity Building: Concept, Structural and Non-structural Measures ,Capacity Assessment; Strengthening Capacity for Risk reduction ,Counter-Disaster Resources and their utility in Disaster Management ,Legislative Support at the state and national levels.

UNIT - IV:

Coping with Disaster ,Coping Strategies; alternative adjustment processes, Changing Concepts of disaster management ,Industrial Safety Plan; Safety norms and survival kits, Mass media and disaster management.

UNIT - V:

Planning for disaster management, Strategies for disaster management planning, Steps for formulating a disaster risk reduction plan, Disaster management Act and Policy in India. Organizational structure for disaster management in India, Preparation of state and district disaster management plans .

TEXT BOOKS:

1. Alexander, D. Natural Disasters, ULC press Ltd, London, 1993.
2. Carter, W.N. Disaster Management: A Disaster Management Handbook, Asian Development Bank, Bangkok, 1991.
3. Manual on Natural Disaster Management in India, NCDM, New Delhi, 2001.

REFERENCES:

1. Abarquez I. & Murshed Z. Community Based Disaster Risk Management: Field Practitioner's Handbook, ADPC, Bangkok, 2004.
2. Goudie, A. Geomorphological Techniques, Unwin Hyman, London 1990.
3. Goswami, S.C Remote Sensing Application in North East India, Purbanchal Prakesh, Guwahati, 1997.

Course Outcomes:

The Students will be able to

1. Acquired knowledge on various types of disasters and hazards.
2. Distinguish between the hazard and a disaster can be analysed.
3. Acquired knowledge on the various approaches of Disaster Risk Reduction (DRR)
4. Ability to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction.
5. Develop ability to respond to different disasters.

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ELECTRIC COSTING AND ESTIMATION
(OPEN ELECTIVE - III)

Course Objectives:
The Student will

1. emphasize the estimation and costing aspects of all electrical equipment,
2. design and estimation of wiring
3. design overhead and underground distribution lines,
4. classify types of substations and illumination
5. understand the Installation and costing of Electrical Equipment.

UNIT-I : Design Considerations of Electrical Installations
Electric Supply System, Three phase four wire distribution system, Protection of Electric Installation against over load, short circuit and Earth fault, Earthing, General requirements of electrical installations, testing of installations, Neutral and Earth wire, Types of loads, Systems of wiring, Service connections, Service Mains, Sub-Circuits, Location of Outlets, Location of Control Switches, Location of Main Board and Distribution board, Guide lines for Installation of Fittings, Load Assessment, Permissible voltage drops and sizes of wires, estimating and costing of Electric installations.

UNIT-II : Electrical Installation for Different Types of Buildings and Small Industries
Electrical installations for residential buildings – estimating and costing of material, Electrical
installations for commercial buildings, Electrical installations for small industries.

UNIT-III: Overhead and Underground Transmission and Distribution Lines
Introduction, Supports for transmission lines, Distribution lines – Materials used, Underground cables, Mechanical Design of overhead lines, Design of underground cables.

UNIT-IV: Substations
Introduction, Types of substations, Outdoor substation – Pole mounted type, Indoor substations – Floor mounted type.

UNIT-V: Design of Illumination Schemes
Introduction, Terminology in illumination, laws of illumination, various types of light sources, Practical lighting schemes LED, CFL and OCFL differences.

TEXT BOOKS:

1. "K. B. Raina, S. K. Bhattacharya", "Electrical Design Estimating and Costing", NewAge International Publisher, 2010.
2. "Er. V. K. Jain, Er. Amitabh Bajaj", "Design of Electrical Installations", UniversityScience Press.

REFERENCES:

1. Code of practice for Electrical wiring installations,(System voltage not exceeding 650volts), Indian Standard Institution, IS: 732-1983.
2. Guide for Electrical layout in residential buildings, Indian Standard Institution, IS:4648-1968.
3. Electrical Installation buildings Indian Standard Institution, IS: 2032.
4. Code of Practice for selection, Installation of Maintenance of fuse (voltage notexceeding 650 V), Indian Standard Institution, IS: 3106-1966.
5. Code of Practice for earthling, Indian Standard Institution, IS: 3043-1966.
6. Code of Practice for Installation and Maintenance of induction motors, IndianStandard Institution, IS: 900-1965.
7. Code of Practice for electrical wiring, Installations (system voltage not exceeding 650Volts), Indian Standard Institution, IS: 2274-1963.
8. "Gupta J. B., Katson, Ludhiana", "Electrical Installation, estimating and costing", S.K. Kataria and sons, 2013

Course outcomes:

The student will be able to:

1. Understand the design considerations of electrical installations.
2. Design electrical installation for buildings and small industries.
3. Analyze the feasibility of type of substation
4. Understand the performance of various materials used for transmission and distribution
5. Identify and design the various types of light sources for different applications.

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POWER PLANT ENGINEERING
(OPEN ELECTIVE - III)

Course Objectives:
The Student will

1. provide the knowledge on principles of solar radiation & solar energy collection & storage and applications.
2. prepare graduates to express the Knowledge on wind energy, geo-thermal energy, and ocean energy plants.
3. understand the behaviour of different power plants.
4. analyse different types of steam cycles and it's efficiencies in a steam power plant.
5. Expose on principle of safety and environmental issues.

UNIT-I : Thermal Power Plants
Basic thermodynamic cycles, various components of steam power plant- Layout- Pulverized coal burners- Fluidized bed combustion - Coal Handling systems - Ash handling systems - Forced draft and induced draft fans- Boilers- Feed pumps- Super heater- Regenerator - Condenser- Dearearators - Cooling tower

UNIT-II Hydro-electric Power Plants(Elementary Aspects)
Layout- Dams -Selection of water turbines – types - Pumped storage hydel plants

UNIT-III: Nuclear Power Plants(Elementary Aspects)
Principles of nuclear energy- Fission reactions - Nuclear reactor-Nuclear power plants

UNIT-IV: Gas and Diesel Power Plants(Elementary Aspects)
Types, Open and closed cycle gas turbine, Work output & thermal efficiency, Methods to improve performance-reheating, Inter-coolings, Regeneration-Advantage and disadvantages - Diesel engine power plant, Component and layout.

UNIT-V: Non-Conventional Power Generation:(Elementary Aspects)
Solar energy collectors, OTEC, Wind power plants, Tidal power plants and geothermal resources, Fuel cell, Thermoelectric power generation.

TEXT BOOKS:

1. Arora and Domkundwar, -"A Course in Power Plant Engineering", Dhanpat Rai and Co.Pvt. Ltd., New Delhi.
2. P.K. Nag,-"Power Plant Engineering", Tata McGraw Hill, Second Edition, Fourth reprint 2003.

REFERENCES:

1. Bernhardt G.A. Skrotzki and William A. Vopat, -"Power Station Engineering and Economy", Tata McGraw Hill Publishing Company Ltd., New Delhi, 20th reprint 2002.
2. G.D. Rai, -"An Introduction to Power Plant Technology", Khanna Publishers, Delhi-110 005.
3. M.M. El-Wakil, -"Power Plant Technology", Tata McGraw Hill, New Delhi, 1984.

Course outcomes:

The student will be able to:

1. Describe basic working principles of gas turbine and diesel engine power plants.
2. Define the performance characteristics and components of such power plants.
3. List the principal components and types of nuclear reactors.
4. List types, principles of operations, components and applications of steam turbines, steam generators, condensers, feed water and circulating water systems.
5. Estimate different efficiencies associated with power plant systems

J.B INSTITUTE OF ENGINEERING & TECHNOLOGY
AUTONOMOUS

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

FUNDAMENTALS OF ROBOTICS

Open Elective - III

Course Objectives: The Student will

1. understand the theoretical aspects of Robotics
2. acquire practical experience in the field of Robotics through design projects and case studies.
3. understand the importance of robots in various fields of engineering.
4. understand trajectory planning and types of motion
5. expose to various robots and their operational details.

UNIT-I: Robotics-Introduction-classification with respect to geometrical configuration (Anatomy), Controlled system & chain type: Serial manipulator & Parallel Manipulator.

Components of Industrial robotics-precession of movement-resolution, accuracy & repeatability-Dynamic characteristics- speed of motion, load carrying capacity & speed of response-Sensors-Internal sensors: Position sensors & Velocity sensors, External sensors: Proximity sensors, Tactile Sensors, & Force or Torque sensors.

UNIT-II: Grippers - Mechanical Gripper-Grasping force-Engelberger-g-factors-mechanisms for actuation, Magnetic gripper, vaccume cup gripper-considerations in gripper selection & design. Industrial robots specifications. Selection based on the Application.

UNIT-III: Kinematics-Manipulators Kinematics, Rotation Matrix, Homogenous Transformation Matrix, D-H transformation matrix, D-H method of assignment of frames. Direct and Inverse Kinematics for industrial robots. Differential Kinematics for planar serial robots

UNIT-IV: Trajectory planning: Joint space scheme- Cubic polynomial fit-Obstacle avoidance in

operation space-cubic polynomial fit with via point, bleding scheme. Introduction Cartesian space scheme. Control- Interaction control, Rigid Body mechanics, Control architecture-position, path velocity, and force control systems, computed torque control, adaptive control, and Servo system for robot control.

UNIT-V: Programming of Robots and Vision System-Lead through programming methods-Teach pendent- overview of various textual programming languages like VAL etc.

Introduction to Mobile Robots: A brief history of mobile robotics, applications and market. Recent advances in the mobile robotics for RISE (Risky Intervention and Surveillance

Environment) applications.

TEXT BOOKS:

1. Industrial Robotics / Groover M P /Mc Graw Hill
2. Introduction to Robotics / John J. Craig/ Pearson

REFERENCES:

1. Theory of Applied Robotics /Jazar/Springer.H. Asada and J. J. E. Slotine, "*Robot Analysis and Intelligence*", Wiley Inter-Science. 1986
2. Robotics / Ghosal / Oxford

Course outcomes: The student will be able to

1. apply the basic components of robots.
2. differentiate types of robots and robot grippers.
3. model forward and inverse kinematics of robot manipulators.
4. analyze forces in links and joints of a robot.
5. programme a robot to perform tasks in differential applications.

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

DIGITAL SYSTEMS USING VERILOG

(Open Elective -III)

COURSE OBJECTIVES

The Students will

1. understand the constructs and conventions of the Verilog HDL programming.
2. Industrial-standard design software for coding, synthesis and simulation.
3. Learn in-depth study of combinational and sequential hardware systems and the use of finite state machines in the design of sequential systems.
4. understand concept of Programmable Devices, PLA, PAL, CPLD and FPGA and implement digital system using VHDL.
5. implement combinational and sequential circuits using VHDL.

UNIT I: Review of Logic Design Fundamentals

Combinational Logic, Boolean Algebra and Algebraic Simplification, Karnaugh maps, Designing with Nand and Nor Gates, Hazards in Combinational Networks, Flip-flops and latches,Mealy Sequential Network, Equivalent States and reduction of State Tables, Sequential Network Timing, Setup and Hold Times, Synchronous Design, Tristate Logic and Buses.

UNIT II: Introduction to Verilog

Computer-Aided Design, Hardware Description Languages, Verilog Description of Combinational Circuits, Verilog Modules, Assignments, Procedural Assignments, Modeling Flip-Flops Using Always Block, Always Blocks Using Event Control Statements, Delays in Verilog, Compilation, Simulation and Synthesis of Verilog Code, Data Types and Operators, Simple Synthesis Examples for Multiplexers, Modeling Registers and Counters Using Verilog Always Statements, Behavioral and Structural Verilog, Constants, Arrays, Loop in Verilog, Testing in Verilog Model.

UNIT III: Introduction to Programmable Logic Devices

Brief Overview of Programmable Logic Devices, Simple Programmable Logic Devices(SPLDs),Complex Programmable Logic Devices(CPLDs),Field-Programmable Gate Arrays(FPGAs), Problems.

Design Examples

BCD to 7-Segment Display Decoder, A BCD Adder, 32-Bit Adders, Traffic Light Controller, State Graphs for Control Circuits, Scoreboard and Controller, Array Multiplier.

UNIT IV: SM Charts and Microprogramming

State Machine Charts, Derivation of SM Charts, Realization of SM Charts, Implementation of the Dice Game, Microprogramming, Linked State Machine.

Designing with Field Programmable Gate Arrays

Implementing Functions in FPGAs, Implementing Functions Using Shannon's Decomposition, Carry Chains in FPGAs, Examples of Logic Block in Commercial FPGAs, Dedicated memory in FPGA, Dedicated Multipliers in FPGAs, Cost of Programmability.

UNIT V:Floating-Point Arithmetic

Representation of Floating-Point Numbers, Floating-point Multiplication, Floating-point Additions, Other Floating-Point Operations.

Hardware Testing and Design for Testability

Testing Combinational Logic, Testing Sequential Logic, Scan Testing, Boundary Scan, Build-In Self-Test.

TEXTBOOKS:

1. By Charles Roth, Lizy K. John, Byeong Kil Lee,"Digital System Design using Verilog".
2. Zainalabdien Navabi, Verilog Digital System Design, TMH, 2nd edition.

REFERENCE BOOKS:

1.T.R.Padmanabhan & Bala Tripura sundari, "Design through Verilog HDL", WSE2004 IEEE press.

2.Fundamentls of Digital Logic with Veilog design by Stephen Brown, Zvonkoc Vranesic, TMH, 2nd edition, 2010.

3. Digital Logic Design using Verilog , State machine & synthesis for FPGA, Sunggu Lee, Cengage Learning ,2009.

4. Verilog HDL - Samir Palnitkar, 2nd Edition, Pearson Education, 2009.

COURSE OUTCOMES

The Students will be able to:

1. describe, design, simulates and synthesize the computer hardware.
2. practice verilog hardware description language.
3. develop program codes for synthesis-friendly combinational and sequential logic incorporating the concept of sustainability of design and development.
4. analyze, design and implement sequential logic circuits.
5. construct digital system design using PLD.

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ADVANCED COMPUTER ARCHITECTURE

(Open Elective -III)

COURSE OBJECTIVES:

The Student will

1. understand the fundamentals of computer design and technology trends.
2. familiarize with the Instruction level parallelism.
3. gain knowledge about memory design and virtual memory.
4. know about architectures of multiprocessors and storage systems.
5. analyze the Inter connection networks and design of clusters.

UNIT-I

Fundamentals of Computer design- Technology trends- cost- measuring and reporting performance quantitative principles of computer design. Instruction set principles and examples- classifying instruction set- memory addressing- type and size of operands- addressing modes for signal processing-operations in the instruction set- instructions for control flow- encoding an instruction set.-the role of compiler.

UNIT-II

Instruction level parallelism (ILP)- over coming data hazards- reducing branch costs –high performance instruction delivery- hardware based speculation- limitation of ILP. ILP software approach- compiler techniques- static branch protection - VLIW approach - Hardware support for more ILP at compile time- Hardware verses Software Solutions.

UNIT-III

Memory hierarchy design- cache performance- reducing cache misses penalty and miss rate – virtual memory- protection and examples of VM.

UNIT-IV

Multiprocessors and thread level parallelism- symmetric shared memory architectures- distributed shared memory- Synchronization- multi threading. Storage systems- Types – Buses - RAID- errors and failures- bench marking a storage device- designing a I/O system.

UNIT-V

Inter connection networks and clusters- interconnection network media – practical issues in interconnecting networks- examples – clusters- designing a cluster.

TEXT BOOKS:

1. Computer Architecture and Parallel Processing, Kai Hwang and A Briggs International edition Mcgraw-Hill.
2. Advanced Computer Architectures, Dezso Sima, Terence Fountain, Peter Kacsuk, Pearson.
3. Parallel Computer Architecture, A Hardware/Software Approach, david E Culler, Jaswinder Pal Singh, Anoop Gupta, Elseveir.

REFERENCE BOOKS:

1. Computer Architecture, A quantitative approach, 3rd edition, John L Hennessy and David A Patterson Morgan Kufmann (an imprint elsevier).

COURSE OUTCOMES:

The Students will be able to

1. understand the fundamentals of computer design and technology trends.
2. expertise with the Instruction level parallelism.
3. illustrate the concepts of memory design and virtual memory.
4. obtain knowledge on architectures of multiprocessors and storage systems.
5. design the Inter connection networks and design of clusters.

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IV- I Semester	**3**	**0-0-0**	**3**

SOFTWARE ENGINEERING

(Open Elective-III)

Course objectives:

The Students will :

1. Analyze basic Software engineering methods.
2. Describe software engineering layered technology and Process frame work.
3. Design software architecture and UML modeling
4. Recognize testing approaches such as unit testing and integration testing.
5. Demonstrate software evolution and related issues such as version and risk management

UNIT - I:

Introduction to Software Engineering: The evolving role of Software, changing nature of Software, Software Myths.
A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.
Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

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 Analysis 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.
Creating an architectural design: Software architecture, Data design, Introduction to UML, Importance of modeling, Principle of modeling, Concepts of modeling and architecture.
Object-Oriented Design: Objects and object classes, An Object-Oriented design process, Design evolution.
Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

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.
Metrics for Process and Products: Software Measurement, Metrics for software quality.
UNIT - V:

Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.
Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

TEXT BOOKS:

1. Software Engineering A Practitioner's Approach, Roger S Pressman, 6th edition. McGraw-Hill International Edition.
2. Software Engineering, Ian Sommerville, 7th edition, Pearson education.

REFERENCE BOOKS:

1. The Unified Modeling Language, User Guide by Grady Booch, James Rambaugh, Ivar Jaccobson.
2. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
3. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008

Course outcomes:

The Students will be able to:

1. Apply software engineering principles and techniques
2. Evaluate requirements for a software system
3. Apply the process of analysis and design using the object-oriented approach
4. Write test cases for different requirement and implement testing.
5. Evaluate different version and risk management

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IV Year I- Semester	**3**	**0-0-0**	**3**

JAVA PROGRAMMING
(Open Elective-III)

Course Objectives:
The students will :

1. Describe with constructors and string handling functions.
2. Explain Inheritance and Polymorphism.
3. Discuss Exception handling and Multithreading.
4. Review Applet Programming, Event Handling and scripting.
5. Discuss Collection frame work in java and Files.

UNIT – I

OOP concepts – Data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, classes and objects, Procedural and object oriented programming paradigms

Java programming - History of Java, comments, data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow - block scope, conditional statements, loops, break and continue statements, simple java stand alone programs, arrays, console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection,

String handling: String, StringBuffer, StringTokenizer.

UNIT – II

Inheritance - Inheritance hierarchies, super and sub classes, Member access rules, super keyword, preventing inheritance: final classes and methods, the Object class and its methods

Polymorphism- dynamic binding, method overriding, abstract classes and methods.

Interfaces – Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface.

Inner classes – Uses of inner classes, local inner classes, anonymous inner classes, static Inner classes, examples.

Packages-Defining, Creating and Accessing a Package, Understanding CLASSPATH, Importing packages.

UNIT – III

Exception handling – Dealing with errors, benefits of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes.

Multithreading - Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, producer consumer pattern.

UNIT – IV

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.

Applets – Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet, passing parameters to applets, applet security issues.

UNIT – V

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

Files – streams- byte streams, character streams, text Input/output, binary input/output, random access file operations, File management using File class.

Connecting to Database - JDBC Type 1 to 4 drivers, connecting to a database, querying a database and processing the results, updating data with JDBC.

TEXT BOOKS:

1. Java Fundamentals – A comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.
2. Java The complete reference, 8th editon, Herbert Schildt, TMH.

REFERENCE BOOKS :

1. Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education (OR) Java: How to Program P.J.Deitel and H.M.Deitel, PHI.
2. Object Oriented Programming through Java, P.Radha Krishna, Universities Press.
3. Thinking in Java, Bruce Eckel, Pearson Education
4. Programming in Java, S.Malhotra and S.Choudhary, Oxford Univ. Press.

Course Outcomes:

The Students will be able to:

1. Apply constructors and string Handling.
2. Demonstrate Inheritance and Polymorphism.
3. Choose Exception handling and Multithreading.
4. Practice applet Programming Solve Event Handling.
5. Choose Collection frame work and files.

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

SOFTWARE PROJECT MANAGEMENT
(Open Elective-III)

COURSE OBJECTIVES:

The Students will:

1. Discuss the conventional and contemporary software project management principles.
2. Understand the ability to assess and plan project schedule and assign resources
3. Select an appropriate project development methodology among various alternating processes.
4. Identify project risks, understand the responsibilities, monitor and track project deadlines and the capability to work in a team environment.

UNIT-I

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

Evolution of Software Economics: Software Economics.

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

UNIT-II

The old way and the New way: The principles of conventional software engineering, Principles of modern software management.

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.

UNIT-III

Model Based Software Architectures: A Management perspective and Technical perspective.

Work Flows of the Process: Software process workflows, Iteration workflows.

Checkpoints of the Process: Major milestones, Minor milestones, Periodic status assessments.

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

UNIT-IV

Project Organizations and Responsibilities: Line-of-business organizations, Project organizations.

Process Automation: Automation building blocks.

Project Control and Process Instrumentation: The seven core metrics, Management indicators, quality indicators, life cycle expectations, and pragmatic software metrics.

UNIT-V

Future Software Project Management: Modern project profiles, next generation software economics, modern process transitions.

Tailoring the Process: Process discriminants.
Case Study: The command centre processing and display system-replacement (CCPDS-R)

TEXT BOOKS:

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

REFERENCE BOOKS:

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

COURSE OUTCOMES:

The Student is able to:

1. Describe the conventional s/w management and explain how to improve s/w economics
2. Understand and discuss the key phases of project management and the key skills associated with each.
3. Explain the concept of workflows and checkpoints of the processes.
4. Discuss the responsibilities in the project organization.
5. Distinguish between conventional project and modern project profiles.

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

INTRODUCTION TO INTELLIGENT SYSTEMS
Open Elective - III

Course Objectives:

At the end of the course, students will learn:

1. Understand In-depth of specialist bodies of knowledge within the engineering discipline.
2. Establish engineering methods to complex engineering problem solving.
3. Be Fluent application of engineering techniques, tools and resources

UNIT–I:

Introduction To Artificial Intelligence: Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem, characteristics, Production system characteristics -Specialized production system

UNIT–II:

Representation Of Knowledge: Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic Structured representation of knowledge.

UNIT–III:

Knowledge Inference: Knowledge representation -Production based system, Frame based system.

UNIT–IV:

Inference - Backward chaining, forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.

UNIT-V:

Expert Systems: Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge, Heuristics.

Text Books:

1. Kevin Night, Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Tata McGraw-Hill Education Private Limited, 3rd edition, 2009, ISBN: 978-0070678163.
2. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2nd edition, 2007.ISBN, 0132097680.

References:

1. Peter Jackson, “Introduction to Expert Systems”, Pearson Education, 3rd edition, 2007. ISBN-13: 978-0201876864
2. Stuart Russel, Peter Norvig , “AI – A Modern Approach”, Pearson Education, 2nd edition, ISBN-13: 978-0137903955

Course Outcomes:

The Students will be able to:

1. Gain basic understanding of the underlying principles and philosophy of computational intelligence systems Technologies.
2. Be capable of constructing intelligent systems (in software) that perform useful engineering tasks

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B.Tech.	**L**	**T-P-D**	**C**
IV Year - I Sem	**3**	**0-0-0**	**3**

INTRODUCTION TO GEOLOGY

(OPEN ELECTIVE III)

COURSE OBJECTIVES:

The Student will:

1. introduce rock types and their physical properties
2. acquaint with different structures occurring in rocks
3. get idea about Ground water, and aquifers
4. get idea about coal formation and its stages.
5. know about minerals occurring in India.

UNIT-I:

Introduction, Definitions, Importance of geology in mining, Types of rocks, Physical properties of rocks.

UNIT-II:

Structural Geology: Definition, terminology, and Primary and secondary structures: Bedding, lineation, foliation, cleavage, Strike and dip. Definition of faults, folds and joints and their types, Unconformities and its kinds.

UNIT-III:

Ground Water: Introduction, Hydrological Cycle, origin and occurrence of groundwater, water table. Aquifers: Types of aquifers, confined and unconfined aquifers, perched aquifers.

UNIT-IV:

Coal: Stages of formation, composition, theories of formation of coal.

UNIT-V:

Occurrence and distribution of important metallic mineral deposits in India: Iron – Copper, - Lead and Zinc – Manganese – Aluminum – Chromium.

Occurrence and distribution of important non-metallic mineral deposits in India: Asbestos – kyanite – Sillimanite.

TEXTBOOKS:

1. Structural Geology – Billings, M.P. Prentice Hall.
2. Engineering geology –by Dr. Chennkeshavulu.

REFERENCE BOOKS:

1. A Textbook of Geology: Mukherjee P.K., The World Press Pvt. Limited Calcutta.

COURSE OUTCOMES:

The student will be able to:

1. Understand about rocks and their properties
2. Learn about different structures occurring in rocks
3. Understand about ground water, water table and aquifers
4. Learn about coal and its formation theories
5. Distinguish metallic and non-metallic minerals.

Open Elective - IV

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

INDUSTRIAL WASTE WATER TREATMENT
(Open Elective-IV)

COURSE OBJECTIVES:

The Students will:

1. Distinguish between the quality of domestic and industrial water requirements and Wastewater quantity generation
2. Understand the industrial process, water utilization and waste water generation
3. Impart knowledge on selection of treatment methods for industrial wastewater
4. Acquire the knowledge on operational problems of common effluent treatment plants.
5. Gain knowledge on different techniques and approaches for minimizing the generation and application of Physio chemical and biological treatment methods for recovery, reuse and disposal of industrial wastewater.

UNIT – I:

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

UNIT – II:

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

UNIT-III:

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

UNIT-IV:

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

UNIT-V:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

COURSE OUTCOMES:

The Students will be able to

1. Learn a firm foundation and knowledge of mathematics, science and engineering principles and the ability to apply the knowledge.
2. Define and reason about fundamental concepts of waste water treatment
3. Design and conduct experiments and the ability
4. To analyze the data, interpret results and draw conclusions.
5. Design a component, system or process to meet desired needs and imposed constraints.

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

AIR POLLUTION AND CONTROL
(Open Elective-IV)

Course Objectives:

The Students will

1. introduce students to basic concepts of pollution.
2. gain the knowledge of causes of air pollution.
3. gain the knowledge of health related to air pollution.
4. develop skills relevant to control of air pollution.
5. Understand the quality of air.

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

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

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

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

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

Text Books:

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

References:

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

Course Outcomes:

The Students will be able to

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

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

DISTRIBUTED GENERATION AND MICROGRID
(OPEN ELECTIVE - IV)

Course Objectives:
The Student will

1. illustrate the concept of distributed generation
2. analyze the impact of grid integration.
3. study concept of Micro grid and its configuration
4. understand the Economic and control aspect of DGs
5. find optimal size, placement and control aspects of DGs

UNIT-I : Need for Distributed Generation
Renewable sources in distributed generation - Current scenario in distributed generation - Planning of DGs – Siting and sizing of DGs – Optimal placement of DG sources in distribution systems.

UNIT-II : Grid Integration of DGs
Different types of interfaces - Inverter based DGs and rotating machine based interfaces - Aggregation of multiple DG units - Energy storage elements - Batteries, ultra capacitors, flywheels.

UNIT-III: Technical Impacts of DGs
Transmission systems, Distribution systems, De-regulation – Impact of DGs upon protective relaying – Impact of DGs upon transient and dynamic stability of existing distribution systems

UNIT-IV: Economic and Control Aspects of DGs
Market facts, issues and challenges - Limitations of DGs - Voltage control techniques, Reactive power control, Harmonics, Power quality issues - Reliability of DG based systems – Steady state and Dynamic analysis.

UNIT-V: Introduction to Micro-grids
Types of micro-grids – Autonomous and non-autonomous grids – Sizing of micro-grids - Modeling & analysis - Micro-grids with multiple DGs – Micro-grids with power electronic interfacing units - Transients in micro-grids - Protection of micro-grids – Case studies

TEXT BOOKS:

1. H. Lee Willis, Walter G. Scott , 'Distributed Power Generation – Planning and Evaluation', Marcel Decker Press, 2000.
2. M.Godoy Simoes, Felix A.Farret, 'Renewable Energy Systems – Design and Analysis with Induction Generators', CRC press.

REFERENCES:

1. Robert Lasseter, Paolo Piagi, ' Micro-grid: A Conceptual Solution', PESC 2004, June 2004.
2. F. Katiraei, M.R. Iravani, 'Transients of a Micro-Grid System with Multiple Distributed Energy Resources', International Conference on Power Systems Transients (IPST'05) in Montreal, Canada on June 19-23, 2005.
3. Z. Ye, R. Walling, N. Miller, P. Du, K. Nelson, 'Facility Microgrids', General Electric Global Research Center, Niskayuna, New York, Subcontract report, May 2005.

Course outcomes:

The student will be able to:

1. Find the size and optimal placement DG
2. Analyze the impact of grid integration and control aspects of DGs
3. Model and analyze a micro grid taking into consideration the planning and Operational issues of the DGs to be connected in the system
4. Describe the technical impacts of DGs in power systems.
5. Implement the micro grids and their control schemes

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

RENEWABLE ENERGY SOURCES
(OPEN ELECTIVE -IV)

Course Objectives:
The Student will

1. understand the various types of renewable energy sources.
2. analyze the principle and operation of direct energy conversion.
3. understand and analyze the hybrid energy systems.
4. apply the renewable energy sources to real world electrical and electronics problems.
5. apply the renewable energy sources to real world electrical and electronics applications.

UNIT-I : 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, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II : Solar Energy Collection
Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.
Solar Energy Storage and Applications: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-III: Wind Energy
Sources and potentials, Power from wind, Properties of air and wind, Types of wind turbines, Operating 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-IV: 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.

UNIT-V: Direct Energy Conversion
Need for DEC, Carnot cycle, limitations, and principles of DEC
Environmental effects of energy conversion systems:
Pollution from coal and preventive measures, Steam stations and pollution, Pollution free energy systems

TEXT BOOKS:

1. Non-Conventional Energy Sources /G.D. Rai, khanna publications.
2. Renewable Energy Sources /Twidell&Weir CRC Press .

REFERENCES:

1. Renewable Energy resources /Tiwari and Ghosal/Narosa
2. Renewable Energy Technologies /Ramesh & Kumar /Narosa
3. Non-Conventional Energy Systems / K Mittal /Wheeler
4. Renewable Energy sources and emerging technologies by D.P. Kothari, K.C. Singhal, P.H.I
5. Systems" -Academic Press, 1st Edition 2009.

Course outcomes:

The student will be able to:

1. Understand the need of utilization of alternate energy resources.
2. Discuss the collection of solar energy, storage of solar energy and its applications.
3. Illustrate the potential of Wind and bio mass as a renewable source.
4. Understand the potential of geothermal energy and ocean energy as a renewable source.
5. Discuss the direct energy conversion systems.

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

Open Elective - IV

DIGITAL MANUFACTURING

Course Objectives:
The Student will

1. Understand the need of digital fabrication
2. Understand about Two dimensional layer by layer techniques
3. Know about extrusion based systems, post processing and the software issues involved in digital fabrication
4. Know the applications of digital fabrication

UNIT-I :

INTRODUCTION TO ADDITIVE MANUFACTURING: Introduction to AM, AM evolution, Classification of Additive Manufacturing, Distinction between AM & CNC Machining, Advantages of AM

UNIT-II :

TWO- DIMENSIONAL LAYER- BY LAYER TECHNIQUES: Stereo-lithography (SL), Solid Foil Polymerization (SFP), Selective Laser Sintering (SLS), Selective Powder Building (SPB), Ballistic Particle Manufacturing (PM)

UNIT-III:

EXTRUSION BASED SYSTEMS: Introduction, basic principles, Fused Deposition Modeling, Materials, and Limitations of FDM

POST PROCESSING: Introduction, Support Material Removal, Surface Texture Improvements, Accuracy Improvements, Aesthetic Improvements

UNIT-IV:

SOFTWARE ISSUES FOR ADDITIVE MANUFACTURING: Introduction, Preparation of CAD Models: The STL file, Problems with STL files, STL file manipulation, Beyond the STL file, Additional software to assist AM

UNIT-V:

AM APPLICATIONS:

Applications in design, Applications in Engineering Analysis and Planning

Medical Applications: Customized Implants and Prosthesis, Aerospace applications and Automotive Applications

Other Applications: Jewelry Industry, Coin Industry, Tableware Industry.

TEXT BOOKS:

1. Ian Gibson, David W Rosen, Brent Stucker, “Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing”, Springer 2010.
2. Chuaa Chee Kai, Leong Kah Fai, “Rapid Prototyping: Principles & Applications”, World Scientific, 2010.

REFERENCES:

1. Ali K.Karmani, EmandAbouel Nasr, “Rapid Prototyping: Theory and Practice”, Springer 2006.
2. Andreas Gebhardt, Understanding Additive Manufacture: Rapid Prototyping, Rapid Tooling and Rapid Manufacture, Hanser Publishers, 2013.
3. Hopkinson, N.Haque, and Dickens Rapid Manufacturing: Advanced Research in Virtual and Rapid Prototyping, Taylor and Francis, 2007.

Course outcomes:

The student will be able to:

1. Understand the importance of digital fabrication
2. Identify different techniques involved in two dimensional layering
3. Analyze the software issues involved in digital fabrication and know about extrusion based systems and post processing
4. Apply the knowledge gained in the digital fabrication

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EMBEDDED SYSTEM DESIGN

(Open Elective-IV)

COURSE OBJECTIVES:

The Student will

1. understand the characteristics of embedded systems and application areas.
2. explain the core of embedded system and gain the knowledge of Embedded Software.
3. analyze ARM Cortex processor and its architecture.
4. gain knowledge on software aspects of embedded systems.
5. understand various communication protocols in Embedded Systems.

UNIT-I

The concept of embedded systems design, Embedded microcontroller cores, embedded memories. Examples of embedded systems, quality attributes- Design metrics - challenges. Embedded Hardware: Processor embedded into a system- Processor selection- embedded hardware units and devices.

UNIT-II

Embedded Software: An overview of programming languages- challenges and issues related to embedded software development.

Co-design-development process: Design cycle - Embedded software development tools- Target Machines - Linker/Locators - Embedded Software on Target system -Issues in co-design.

UNIT-III

ARM® Cortex™- M0+ processor: Overview - Architecture - Features- interfaces- configurable options-Modes of operation and Execution and Instruction Set- FRDM KL25Z Architecture - Interfacing of I/O devices with FRDM KL25Z.

UNIT-IV

Software aspects of embedded systems: real time programming languages and operating systems for embedded systems.

Technological aspects of embedded systems: Interfacing between analog and digital blocks, signal conditioning, digital signal processing.

UNIT-V

Communication protocols: Network Embedded Systems- Serial Bus Protocols- Parallel Bus Device Protocols, Parallel Communication Network Using ISA,PCI, PIC-X and Advanced Buses- Internet Enabled Systems, Network protocols- Wireless and Mobile System Protocols.

TEXT BOOKS:

1. Shibu K.V, “Introduction to Embedded Systems”, McGraw Hill.
2.J.W.Valvano, "Embedded Microcomputer System: Real Time Interfacing", Brooks/Cole, 2000.

REFERENCE BOOKS:

1. Raj Kamal, “Embedded Systems”, TMH.
2. Frank Vahid, Tony Givargis, “Embedded System Design”, John Wiley.
3. Lyla, “Embedded Systems”, Pearson, 2013.
4. David E. Simon, “An Embedded Software Primer”, Pearson Education.

COURSE OUTCOMES:

The student will be able to

1. define the characteristics of embedded systems, classification and application areas.
2. obtain knowledge on Embedded software and Co-design development.
3. familiarize the working of ARM Cortex processor.
4. develop knowledge on software aspects of embedded systems.
5. employ various communication protocols in Embedded Systems.

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IV Year - II Semester	**3**	**0-0-0**	**3**

SOFTWARE DEFINED RADIO

(Open Elective-IV)

COURSE OBJECTIVES:

The Students will:

1. study fundamentals and state of the art concepts in software defined radio.
2. Understand the concepts of Radio Resource Management.
3. Understand the reconfiguration of the network elements.
4. Remember the object oriented representation of radio and network resources.
5. Study of radio resource management in heterogeneous networks.

UNIT -I

Introduction: The Need for Software Radios, What is Software Radio, Characteristics and benefits of software radio- Design Principles of Software Radio, RF Implementation issues the Purpose of RF Front – End, Dynamic Range- The Principal Challenge of Receiver Design. RF Receiver Front- End Topologies- Enhanced Flexibility of the RF Chain with Software Radios- Importance of the Components to Overall Performance- Transmitter Architectures and Their Issues- Noise and Distortion in the RF Chain, ADC and DAC Distortion.

UNIT -II

Profile and Radio Resource Management : Communication Profiles- Introduction, Communication Profiles, Terminal Profile, Service Profile , Network Profile, User Profile, Communication Profile Architecture, Profile Data Structure, XML Structure, Distribution of Profile Data, Access to Profile Data, Management of Communication Profiles, Communication Classmarks, Dynamic Classmarks for Reconfigurable Terminals, Compression and Coding, Meta Profile Data.

UNIT -III

Radio Resource Management in Heterogeneous Networks : Introduction, Definition of Radio Resource Management, Radio Resource Units over RRM Phases, RRM Challenges and Approaches, RRM Modelling and Investigation Approaches, Investigations of JRRM in Heterogeneous Networks, Measuring Gain in the Upper Bound Due to JRRM, Circuit Switched System, Packet-Switched System, Functions and Principles of JRRM, General Architecture of JRRM, Detailed RRM Functions in Sub-Networks and Overall Systems.

UNIT -IV

Reconfiguration of the Network Elements : Introduction, Reconfiguration of Base Stations and Mobile Terminals, Abstract Modelling of Reconfigurable Devices, the Role of Local Intelligence in Reconfiguration, Performance Issues, Classification and Rating of Reconfigurable Hardware, Processing Elements, Connection Elements, Global Interconnect Networks, Hierarchical Interconnect Networks.

Installing a New Configuration, Applying Reconfiguration Strategies, Reconfiguration Based on Comparison, Resource Recycling, Flexible Workload Management at the Physical Layer,

Optimized Reconfiguration, Optimization Parameters and Algorithms, Optimization Algorithms, Specific Reconfiguration Requirements, Reconfiguring Base Stations, Reconfiguring Mobile Terminals.

UNIT -V

Object – Oriented Representation of Radios and Network Resources: Networks- Object Oriented Programming- Object Brokers- Mobile Application Environments- Joint Tactical Radio System.

Case Studies in Software Radio Design: Introduction and Historical Perspective, SPEAK easy-JTRS, Wireless Information Transfer System, SDR-3000 Digital Transceiver Subsystem, Spectrum Ware, CHARIOT.

TEXT BOOKS:

1. Software Defined Radio Architecture System and Functions- Markus Dillinger, Kambiz Madani, WILEY 2003.
2. Software Defined Radio: Enabling Technologies- Walter Tuttle Bee, 2002, Wiley Publications.

REFERENCE BOOKS:

1. Software Radio: A Modern Approach to Radio Engineering - Jeffrey H. Reed, 2002, PEA Publication.
2. Software Defined Radio for 3G - Paul Burns, 2002, Artech House.
3. Software Defined Radio: Architectures, Systems and Functions - Markus Dillinger,Kambiz. Madani, Nancy Alonistioti, 2003, Wiley.
4. Software Radio Architecture: Object Oriented Approaches to wireless System Engineering–Joseph Mitola, III, 2000, John Wiley & Sons.

COURSE OUTCOMES:

The students will be able to:

1. illustrate the design principles of software defined radio.
2. analyze the analog RF components as front end block in implementation of SDR.
3. visualize digital hardware architectures and development methods.
4. familiarize the radio recourse management in heterogeneous networks.
5. remember the object oriented representation of radio and network resources.

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IV Year - II Semester	**3**	**0-0-0**	**3**

E-COMMERCE

(Open Electives-IV**)**

Course objectives:

The Students will :

1. Gain knowledge about the main objective and at the same time need is transaction on your web store. Of, course if you are selling products online what you require are customers. If you are getting good reach ability then your business will definitely grow. Therefore one of the objectives is high reachability.
2. Solve conversions i.e., if people are coming on your web store and purchasing something then it will calculate as conversions and from the number of people who are buying stuff from your web store we can calculate the conversion rate.
3. Provide customer satisfaction i.e., customer is the main part of any e-commerce business so it's very important to make your customer happy and satisfied by providing quality and desirable products, on time delivery, 24*7 customer support, and timely sale & best deal offers you can make your customer happy. It is one of the main objectives of e-commerce.
4. Receive social popularity i.e., unless and until you are not famous and popular among people you cannot establish your brand. Social presence with omni channel and digital marketing is essential for any e-commerce business.
5. Understand the infrastructure for E-Commerce.

UNIT-I:

Introduction, Electronic Commerce Framework, The Anatomy of E-Commerce applications, E-Commerce Business Models.

E-Commerce Consumer applications, E-Commerce organization applications.

UNIT-II:

Consumer Oriented Applications, mercantile process models, mercantile models from the consumer's perspective, Mercantile from the merchant's perspective.

Types of Electronic Payment Systems, Digital Token-Based Electronic Payment Systems, Smart Cards & Electronic Payment Systems, Credit Card- Based Electronic Payment Systems, Risk & Electronic Payment Systems, Designing Electronic Payment Systems.

UNIT-III:

Electronic Data Interchange, EDI Applications in Business, EDI implementation, MIME, and value added networks.

Intra organizational E-Commerce, Macro forces and Internal Commerce, Work flow automation and Coordination, Customization and Internal Commerce, Supply Chain Management(SCM).

UNIT-IV:

Making a business case for a Document Library: Digital document types, Corporate Data warehouses.

Advertising and Marketing: The new age of Information Based Marketing, advertising on Internet, charting the Online marketing process, Market Research.

UNIT-V:

Consumer Search and Resource Discovery, information search and Retrieval, Electronic commerce catalogs or directories, Information Filtering.

Multimedia and Digital video, Key Multimedia concepts, Digital Video & Electronic Commerce, Desktop Video Processing, Desktop Video Conferencing.

Text Books

1. "Frontiers of electronic commerce" – Kalakota, Whinston, Pearson
2. "E-Commerce", S.Jaiswal – Galgotia

References

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison-Wesley.
2. Goel, Ritendra "E-commerce", New Age International
3. Laudon, "E-Commerce: Business, Technology, Society", Pearson Education

Course outcomes:

The Students will be able to:

1. Demonstrate an understanding of the foundations and importance of e-commerce.
2. Demonstrate an understanding of retailing in e-commerce by:
    a. Analyzing branding and pricing strategies,
    b. Using and determining the effectiveness of market research.
    c. Assessing the effects of disintermediation.
3. Analyze the impact of e-commerce on business models and strategy.
4. Describe internet trading relationships including business-to-business, intra-organizational.
5. Describe the infrastructure for E-Commerce.

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

BIG DATA ANALYTICS

(Open Elective-IV)

Course objectives:

The Students will :

1. Understand the basics of Big Data and Big data Platform
2. Attain the knowledge of Big Data analytics, Approaches and Tools
3. Describe MapReduce fundamentals and HDFC File system
4. Differentiate between Hadoop and RDBMS concepts
5. Apply analytics on Structured and Unstructured Data.

UNIT-I

Big Data Analytics : What is big data, History of Data Management ; Structuring Big Data ; Elements of Big Data ; Big Data Analytics; Distributed and Parallel Computing for Big Data;

Big Data Analytics:What is Big Data Analytics, What Big Data Analytics Isn't, Why this sudden Hype Around Big Data Analytics, Classification of Analytics, Greatest Challenges that Prevent Business from Capitalizing Big Data; Top Challenges Facing Big Data; Why Big Data Analytics Important; Data Science; Data Scientist; Terminologies used in Big Data Environments; Basically Available Soft State Eventual Consistency (BASE); Open source Analytics Tools

UNIT-II:

Understanding Analytics and Big Data: Comparing Reporting and Analysis, Types of Analytics; Points to Consider during Analysis; Developing an Analytic Team; Understanding Text Analytics;

Analytical Approach and Tools to Analyze Data: Analytical Approaches; History of Analytical Tools; Introducing Popular Analytical Tools; Comparing Various Analytical Tools.

UNIT-III:

Understanding MapReduce Fundamentals and HBase : The MapReduce Framework; Techniques to Optimize MapReduce Jobs; Uses of MapReduce; Role of HBase in Big Data Processing; Storing Data in Hadoop

Introduction of HDFS: Architecture, HDFC Files, File system types, commands, org.apache.hadoop.io package, HDF, HDFS High Availability; Introducing HBase, Architecture, Storing Big Data with HBase , Interacting with the Hadoop Ecosystem; HBase in Operations-Programming with HBase; Installation, Combining HBase and HDFS

UNIT-IV:

Big Data Technology Landscape and Hadoop : NoSQL, Hadoop; RDBMS versus Hadoop; Distributed Computing Challenges; History of Hadoop; Hadoop Overview; Use Case of Hadoop; Hadoop Distributors;

HDFC (Hadoop Distributed File System): HDFC Daemons, read,write, Replica Processing of Data with Hadoop; Managing Resources and Applications with Hadoop YARN

UNIT-V:

Social Media Analytics and Text Mining: Introducing Social Media; Key elements of Social Media; Text mining; Understanding Text Mining Process; Sentiment Analysis, Performing Social Media Analytics and Opinion Mining on Tweets;
Mobile Analytics: Introducing Mobile Analytics; Define Mobile Analytics; Mobile Analytics and Web Analytics; Types of Results from Mobile Analytics; Types of Applications for Mobile Analytics; Introducing Mobile Analytics Tools

TEXT BOOKS:

1. BIG DATA and ANALYTICS, Seema Acharya, Subhasinin Chellappan, Wiley publications.
2. BIG DATA, Black Book™ , DreamTech Press, 2015 Edition.
3. BUSINESS ANALYTICS 5e , BY Albright |Winston

REFERENCE BOOKS:

1. Rajiv Sabherwal, Irma Becerra- Fernandez," Business Intelligence –Practice, Technologies and Management", John Wiley 2011.
2. Lariss T. Moss,ShakuAtre, " Business Intelligence Roadmap", Addison-Wesley It Service.
3. Yuli Vasiliev, " Oracle Business Intelligence : The Condensed Guide to Analysis and Reporting", SPD Shroff, 2012

Course Outcomes:
The Students will be able to:

1. Know the basics of Big Data and its environment
2. Achieve the knowledge of Big Data analytics Tools and its Approaches
3. Define MapReduce fundamentals and HDFC Architecture
4. Distinguish between Hadoop and RDBMS concepts
5. Illustrate analytics on Structured and Unstructured Data.

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

COMPUTER FORENSICS
(Open Elective-IV)

Course objectives:

The Students will :

1. Understand Computer forensics fundamentals.
2. Analyze various computer forensics technologies.
3. Know the principles of effective digital forensics investigation techniques.
4. Identify methods for data recovery.
5. Understand the methods for preservation of digital evidence.

UNIT I

Computer Forensics Fundamentals: What is Computer Forensics? Use of Computer Forensics in Law Enforcement, Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of professional Forensics Methodology, Steps taken by computer Forensics Specialists.

Types of Computer Forensics Technology: Types of Military Computer Forensics Technology, Types of Law Enforcement - Computer Forensic Technology - Types of Business Computer Forensics Technology. Computer Forensics Evidence and Capture: Data Recovery Defined- Data Back-up and Recovery- The Role of Back-up in Data Recovery- The Data Recovery Solution.

UNIT II

Evidence Collection and Data Seizure: Why Collection Evidence? Collection Options – Obstacles – Types of Evidence – The Rules of Evidence- Volatile Evidence- General Procedure – Collection and Archiving – Methods of Collection – Artifacts – Collection Steps – Controlling Contamination: The chain of Custody.

Duplication and preservation of Digital Evidence: Preserving the Digital Crime Scene – Computer Evidence Processing Steps – Legal Aspects of Collecting Preserving Computer Forensics Evidence. Computer Image Verification and Authentication: Special Needs of Evidential Authentication – Practical Consideration – Practical Implementation.

UNIT III

Computer Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data – hiding techniques, performing remote acquisitions.

Network Forensics: Network Forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honey net project.

UNIT IV

Processing crime and incident scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a

search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case.
Current computer forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software.

UNIT V

E-Mail investigations: Exploring the role of E-mail in investigation, exploring the role of the client and server in E-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.
Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.
Working with windows and DOS Systems: Understanding file systems, exploring Microsoft File Structures, Examining NTFS Disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS Startup tasks, virtual machines.

TEXT BOOKS

1. Computer forensics, computer crime investigation by John R.Vacca, Firewall Media, New Delhi.
2. Computer forensics and investigations by Nelson, Phillips Enfinger Steuart, CENGAGE Learning.

REFERENCE BOOKS

1. Real Digital Forensics by Keith J.Jones, Rechard Bejtlich, Curtis W.Rose, Addison-Wesley Pearson Education.
2. Forensic compiling, A Tractitioneris Guide By Tony Sammes and Brain Jenkinson, Springer International Edition.
3. Computer Evidence Collection & Presentation by Christopher L.T.Brown, Firewall Media.

Course Outcomes:

The Students will be able to:

1. Utilize a systematic approach to computer investigations, various forensic tools, and collect digital evidence.
2. Perform digital forensics analysis upon Windows, MAC and LINUX operating systems, email investigations.
3. Analyze and carve image files both logical and physical
4. Explain guidelines for investigation reporting.
5. Apply the implications of anti-forensics to the digital forensics investigator

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IV Year - II Semester	**3**	**0-0-0**	**3**

E-DISASTER MANAGEMENT
(Open Elective-IV)

Course Objectives

The Students will :

1. Explain various disasters and their impacts.
2. Describe storage networking technologies such as FC-SAN, NAS, IP-SAN and data archival solution – CAS.
3. Identify different storage virtualization technologies and their benefits.
4. Understand and articulate business continuity solutions including, backup technologies, and local and remote replication.
5. Identify parameters of managing and monitoring storage infrastructure and describe common storage management activities and solutions.

UNIT - I:

Introduction to Disasters: Information Availability, Causes of Information Unavailability, Measuring Information Availability.

Consequences of Downtime; Failure Analysis, Single Point of Failure, Fault Tolerance, Multipathing Software.

UNIT II:

Backup and Recovery: Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations.

Backup Methods, Backup Process, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Technologies.

UNIT - III:

Local Replication: Source and Target, Uses of Local Replica, Data Consistency, Local Replication Technologies, Restore and Restart Considerations Creating Multiple Replicas, Management Interface.

Remote Replication: Modes of Remote Replication, Remote Replication Technologies Network Infrastructure.

UNIT - IV:

Securing the Storage Infrastructure: Storage Security Framework, Risk Triad, Assets, Threats, Vulnerability. Storage Security Domains, Securing the Application Access Domain. Securing the Management Access Domain, Securing Backup, Recovery, and Archive (BURA) , Security Implementations in Storage Networking SAN , NAS, IP SAN.

UNIT - V:

Monitoring the Storage Infrastructure: Parameters Monitored, Components Monitored , Monitoring Examples , Alerts, Storage Management Activities , Availability management , Capacity management , Performance management ,Security Management.

Reporting, Storage Management Examples, Storage Infrastructure Management Challenges, Developing an Ideal Solution, Storage Management Initiative, Enterprise Management Platforms.

Text Books:

1. Information Storage and Management: Storing, Managing, and Protecting Digital Information, Ganesh Rajaratnam,EMC Education Services. Wiley Publications.
2. Executive Guide to Preventing Information Technology Disasters By Richard Ennals. Springer.

Reference Books:

1. Information Management & Computer Security, Port Elizabeth Technikon, Port Elizabeth, MCB UP Ltd.
2. Information Security Management Systems, Godesberger Allee, BSI.

Course Outcomes

The Students will be able to:

1. Apply important storage technologies and their features such as availability, replication, scalability and performance.
2. Show employs project teams to install, administer and upgrade popular storage solutions.
3. Illustrate virtual servers and storage between remote locations.
4. Use the knowledge of Disaster Management Phases.
5. Implement the parameters of managing and monitoring storage infrastructure and describe common storage management activities and solutions.

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IV Year - II Semester	**3**	**0-0-0**	**3**

INTRODUCTION TO NEURAL NETWORKS
Open Elective - IV

Course Objectives:
The Students will learn:

1. Understand the differences and similarities neural network, human brain and feedback systems
2. Learn the different learning techniques
3. Familiar with the concept of single layer perceptron and its algorithms.
4. Familiar with the concept of multilayer perceptron and its algorithms
5. Know the self-organisation mapping techniques.

UNIT–I:
Introduction: What is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks.

UNIT–II:
Learning Process: Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process.

UNIT–III:
Single layer perceptron's: Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perception-convergence theorem, Relation between perception and Bayes classifier foe a Gaussian Environment.

UNIT–IV:
Multilayer Perceptron's: Back propagation algorithm XOR problem, Heuristics, Output representation and decision rule, computer experiment, feature detection.

UNIT-V:
Self –Organization Maps: Two basic feature mapping models, Self-Organization maps, SOM algorithm.

Hopfield models: Hopfield models, computer experiment.

Text Books:

1. Neural networks A comprehensive foundation, Simon Hhaykin, PHI edition.
2. Artificial neural networks-B.Vegnanarayana Prentice Halll of India P Ltd 2005.

References:

1. Neural networks in Computer intelligence, Li Min Fu TMH 2003.
2. Neural networks James A Freeman David M S kapurapearson education 2004.

Course Outcomes:

The Students will be able to:

1. Know differences and similarities between neural network, human brain and feedback systems
2. Get the knowledge of different learning techniques
3. Describe the concept of single layer perceptron and its algorithms.
4. Describe the concept of multilayer perceptron and its algorithms.
5. Analyse the self-organisation mapping techniques.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

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

INTRODUCTION TO MINE ENVIRONMENT

(OPEN ELECTIVE IV)

COURSE OBJECTIVES:

The Students will:

1. introduce about atmospheric, mine air & their limitations
2. acquaint with spontaneous heating and explosions in coal mines
3. get idea about sources of dust, and its control in mines
4. get idea about miners' diseases & lighting in mines
5. know about reclamation of mines, impact of mining on environment & sustainable mining

UNIT-I:

Atmosphere and mine air composition. Origin of gases, properties, limitations of gases in underground mines

UNIT-II:

Spontaneous Combustion: Factors, control measures.

Explosions: Causes of firedamp explosion, preventive measures against firedamp explosion.

UNIT-III:

Dust: Sources in underground and opencast mines, standards and control measures.

UNIT-IV:

Miners diseases, Lighting standards in underground and opencast mines**.**

UNIT-V:

Reclamation, plantation of surface mines, Impact of mining on environment & sustainable mining.

TEXTBOOKS:

1. Elements of Mining Technology (VOL-2) – by D.J. Deshmukh.
2. Surface Mining – by S.K. Das.

REFERENCE BOOKS:

1. Mine Ventilation – by G.B. Mishra.

COURSE OUTCOMES:

The student will be able to:

1. Learn about atmospheric and mine air
2. Learn about spontaneous combustion and explosion in coal mines
3. Understand about dust sources and its control in mines
4. Learn about miners' diseases, mine lighting and its standards
5. Learn about reclamation of mines, impacts of mining on environment and sustainable mining