ACADEMIC REGULATIONS

COURSE STRUCTURE AND

DETAILED SYLLABUS

ELECTRICAL AND ELECTRONICS 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
Bhaskar Nagar, Yenkapally, Moinabad Mandal, R.R. District,
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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 ELECTRICAL AND ELECTRONICS ENGINEERING

Department Vision and Mission

Vision

To be a Centre for State-of-the art learning and research in the area of Electrical and Electronics Engineering, where the stakeholders could explore, experiment and exhibit their expertise with an industrial outlook.

Mission

- To EQUIP the student with advanced learning skills in the field of Electrical and Electronics Engineering as well as the professional skills necessary to face the challenges of the future.
- To ENGINEER the student to engage in research activities leading to innovative applications of technology for the benefit of society.
- To ENABLE the student with the qualities of leadership and social responsibility.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

B.Tech. Electrical and Electronics Engineering

PEOs and PSOs

Program Educational Objectives (PEOs):	
PEO1	To Create an excellent academic learning environment by providing awareness on lifelong learning, apply the technical knowledge in the field of Electrical and Electronics Engineering to pursue higher studies or in their professional career.
PEO2	To demonstrate technical knowledge to analyse, design, develop, optimize, and implement complex electrical systems. Also gain multidisciplinary knowledge through projects and industrial training, providing a sustainable competitive edge in R&D and meeting industrial needs in the field of Electrical and Electronics Engineering.
PEO3	To possess professional and ethical attitudes with effective communication skills, entrepreneurial thinking and an ability to relate engineering issues to the broader social context. Also develop requisite skills to excel in their chosen profession with an awareness of contemporary issues and the need for life -long learning..

Program Specific Outcomes (PSOs):	
PSO1	An ability to mathematically model and analyse the performance of Electrical Machines, Power Electronic systems, Control & Instrumentation systems, Electrical Power systems.
PSO2	An ability to Design the hardware and software requirements for the Development of Electric drives & Control, Conventional & Renewable Energy and Automation.

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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

ELECTRICAL AND ELECTRONICS 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	F115A	Programming for Problem Solving	3	0-0-0	3
3	F110D	Engineering Chemistry	3	1-0-0	4
4	F1107	Programming for Problem Solving Lab	0	0-4-0	2
5	F1106	Workshop and Manufacturing Practices	1	0-4-0	3
6	F1102	Chemistry Lab	0	0-3-0	1.5
7		Induction Programme			
		Total	**10**	**2-11-0**	**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	F120B	English	2	0-0-0	2
3	F122A	Basic Electrical Engineering	3	1-0-0	4
4	F123A	Engineering Drawing & Computer Graphics	1	0-0-4	3
5	F120C	Applied Physics	3	1-0-0	4
6	F1201	English Language and Communication Skills Lab	0	0-2-0	1
7	F1204	Basic Electrical Engineering Lab	0	0-2-0	1
8	F1202	Applied Physics Lab	0	0-3-0	1.5
		Total	**12**	**3-7-4**	**20.5**

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

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

ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE STRUCTURE – R18

II B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	F210A	Mathematics – III	3	1-0-0	4
2	F212A	Electrical Circuit Analysis	3	0-0-0	3
3	F214A	Electronic Devices and Circuits	3	0-0-0	3
4	F212B	Electrical Machines – I	3	1-0-0	4
5	F214F	Electromagnetic Fields	3	1-0-0	4
6	F2141	Electronic Devices and Circuits Lab	0	0-2-0	1
7	F2121	Electrical Circuits Lab	0	0-3-0	1.5
8	F2122	Electrical Machines Laboratory – I	0	0-3-0	1.5
9	F210C	Gender Sensitization	2	0-0-0	0
		Total	**17**	**3-8-0**	**22**

II B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	F224A	Digital Electronics	3	0-0-0	3
2	F222A	Electrical Machines – II	3	1-0-0	4
3	F222B	Power Electronics	3	0-0-0	3
4	F220C	Management Sciences	3	0-0-0	3
5	F220D	Biological Sciences	3	0-0-0	3
6	F2221	Digital Electronics Laboratory	0	0-2-0	1
7	F2222	Electrical Machines Laboratory – II	0	0-3-0	1.5
8	F2223	Power Electronics Laboratory	0	0-3-0	1.5
9	F220F	Environmental Science	2	0-0-0	0
		Total	**17**	**1-8-0**	**20**

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

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

ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE STRUCTURE – R18

III B. Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	F312A	Power Systems – I	3	1-0-0	4
2	F312B	Control Systems	3	1-0-0	4
3	F312C	Electrical Measurements& Instrumentation	3	0-0-0	3
4	F314J	Microprocessors and Microcontrollers	3	0-0-0	3
5	F3121	Electrical Simulation Lab – I	0	0-3-0	1.5
6	F3122	Control Systems Lab	0	0-3-0	1.5
7	F3123	Electrical Measurements Lab	0	0-2-0	1
8	F310B	Managerial Economics and Financial Analysis	3	0-0-0	3
9	F3124	Summer Internship	0	0-2-0	1
		Total	**15**	**2-10-0**	**22**

III B. Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	F322A	Power Systems – II	3	1-0-0	4
2		**Professional Elective – I**	3	0-0-0	3
3		**Professional Elective – II**	3	0-0-0	3
4		**Open Elective - I**	3	0-0-0	3
5	F3221	Electrical Simulation Lab - II	0	0-3-0	1.5
6	F3222	Power Systems Lab	0	0-2-0	1
7	F3223	Microprocessors and Microcontrollers Lab	0	0-3-0	1.5
8	F320C	Professional Ethics	3	0-0-0	3
		Total	**15**	**1-8-0**	**20**

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

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

ELECTRICAL AND ELECTRONICS ENGINEERING

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	F4122	Industry Oriented Mini Project	0	0-0-0	2
7	F4121	Major Project Phase – I	0	0-8-0	4
		Total	**12**	**0-12-0**	**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	F4221	Seminar	0	0-0-0	1
5	F4222	Major Project Phase – II	0	0-1-0	8
		Total	**9**	**0-1-0**	**18**

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

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

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

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

ELECTRICAL AND ELECTRONICS ENGINEERING

PROFESSIONAL ELECTIVE SUBJECTS

Professional Elective – I

Sl. No.	Code	Subject	L	T-P-D	C
1	F322B	Computer Methods in Power Systems	3	0-0-0	3
2	F322C	High Voltage Engineering	3	0-0-0	3
3	F322D	Signals and Systems	3	0-0-0	3

Professional Elective – II

Sl. No.	Code	Subject	L	T-P-D	C
1	F322E	Power Semiconductor Drives	3	0-0-0	3
2	F322F	Switch Mode Power Supplies	3	0-0-0	3
3	F322G	Analysis of Power Converters	3	0-0-0	3

Professional Elective – III

Sl. No.	Code	Subject	L	T-P-D	C
1	F412A	Switch Gear and Protection	3	0-0-0	3
2	F412B	Flexible AC Transmission Systems	3	0-0-0	3
3	F412C	Power Quality	3	0-0-0	3

Professional Elective – IV

Sl. No.	Code	Subject	L	T-P-D	C
1	F412D	Power System Operation and Control	3	0-0-0	3
2	F412E	Special Machines	3	0-0-0	3
3	F412F	Electrical Machine Design	3	0-0-0	3

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

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

ELECTRICAL AND ELECTRONICS ENGINEERING

PROFESSIONAL ELECTIVE SUBJECTS

Professional Elective – V

Sl. No.	Code	Subject	L	T-P-D	C
1	F422A	Electrical Distribution Systems	3	0-0-0	3
2	F422B	Digital Control Systems	3	0-0-0	3
3	F422C	EHV AC Transmission	3	0-0-0	3

Professional Elective – VI

Sl. No.	Code	Subject	L	T-P-D	C
1	F422D	Utilization of Electrical Engineering	3	0-0-0	3
2	F422E	Advanced Control Systems	3	0-0-0	3
3	F422F	HVDC Transmission	3	0-0-0	3

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

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

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

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

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

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

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

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

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

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

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

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

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. EEE	**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 & MIE)

Course Objectives:

The Students will

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

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 e^{ax},$\sin ax$, $\cos ax$, polynomials in x, $e^{ax}V(x)$ and $x\,V(x)$;

Method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

TEXTBOOKS:

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 textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.

Course outcomes:

The Student will be 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

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. EEE	**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:
The Student will

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

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

TEXTBOOKS:

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

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 (16thImpression)
3. Stephen G. Kochan, Programming in C, Fourth Edition, Pearson Education.
4. Herbert Schildt, C: The Complete Reference, McGraw Hill, 4thEdition
5. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

Course outcomes:

The student will be able to:

1. Design the algorithms/flowcharts of C-programs.
2. Write the Code and test a given logic in C programming language.
3. Decompose a problem into functions and to develop modular reusablecode.
4. Make Use of arrays, pointers, strings and structures to write Cprograms.
5. Apply searching and sorting algorithms

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

(F110D) ENGINEERING CHEMISTRY
(COMMON TO EEE, ECE & ECM)

Course Objectives:

The Students will

1. Acquire the skills to critically assess and solve problems related to water requiring the application of chemical principles.
2. Familiar with research design methodology and to use problem-solving techniques associated with electrochemistry.
3. Recognize, organize, and present chemical information coherently through oral and written discourse based on polymers.
4. Apply science and engineering in the analysis and evaluation of process involved in production of energy efficient fuels.
   Invent or discover new environmentally friendly, energy efficient and economically effective engineering materials in a sustainable manner.
5. Learn Nucleophilic substitution reactions

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 N_2, O_2, F_2, 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).

Corrosion: 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 S_N1, S_N2 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 KMnO4 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. P. C. Jain & M. Jain; DhanpatRai, Engineering Chemistry, Publishing Company (P) Ltd., New Delhi.
2. C.N. Banwell, Fundamentals of Molecular Spectroscopy
3. K.P.C. Volhardt and N. E. Schore, Organic Chemistry: Structure and Function, 5th Edition.
4. B.M. Mahan, University Chemistry, Pearson IV Edition.
5. P.W. Atkins, Physical Chemistry.
6. by B.L. Tembe, Kamaluddin and M.S. Krishnan, Engineering Chemistry (NPTEL Web-book).

REFERENCES:

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

Course outcomes:

The Student will be able to

1. Analyze microscopic chemistry in terms of atomic and molecular orbitals
2. Identify the suitability of water for domestic and industrial purposes
3. Apply the basic principle of electro chemistry.
4. Prepare the drug molecules
5. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques

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B.Tech. EEE	**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:

The Student will

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

1. SIMPLE NUMERIC PROBLEMS:

a) Write a program for find the max and min from the three numbers.
b) Write the program for the simple, compound interest.

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:

a) 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)
b) Write a program that finds if a given number is a prime number
c) 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:

a) Write a C program to find the minimum, maximum and average in an array of integers.
b) Write a C program to find Addition of Two Matrices
c) Write a C program to find Multiplication of Two Matrices
d) Write C programs that use both recursive and non-recursive functions
e) Write a program for reading elements using pointer into array and display the values using array.

4.Files:

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

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:

a) 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.)
b) Write a C program to count the lines, words and characters in a given text.

6. Sorting and Searching:

a) Write a C program for using binary search method.
b) Write a C program for linear search.
c) Write a C program that implements the Bubble sort method.
d) Write a C program that implements the Insertion sort method.
e) Write a C program that implements the Quick sort method.
f) 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 is 3 and x is 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      * *
                                              *
```

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

Suggested Reference Books for solving the problems:

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

Course outcomes:

The Student will be able to

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

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

(F1106) WORKSHOP AND MANUFACTURING PRACTICES
(COMMON TO CE, ME, ECE, ECM & MIE)

Course Objectives:
The Student will

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 machining practices.

(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)**
   Welding (arc welding & gas welding), brazing **(1hour)**

(II) WORKSHOP PRACTICE: 60 hours

1. Machine shop **(12 hours) - on Lathe , Milling and drilling**
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)**
   Smithy – Black smithy and Tin smithy **(8 hours)**

TEXT BOOKS :

1. HajraChoudhury S.K., HajraChoudhury 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:

The student will be able to:

1. identify gauging skills.
2. apply skills of Black smithy.
3. apply skills of fabrication in design analysis.
4. produce wooden patterns for casting.
5. apply skills of fabrication in Welding.

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

(F1102) CHEMISTRY LAB
(COMMON TO EEE, ECE & ECM)

Course Objectives:

The Student will

1. Understand the importance of Chemical analysis in their daily life
2. Learn the different practical skills in conducting the lab experiments
3. Analyse the different results of the experiments when different external factors are being applied
4. Improve experimental skills
5. Prepare more environment friendly engineering compounds at low cost

List of 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 $KMnO_4$ by Colorimetry
9. Synthesis of Aspirin and Paracetamol
10. Determination of acid value of coconut oil
11. Thin layer chromatography calculation of R_f values. egortho 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. B.D. Khosla, A. Gulati and V. Garg ,Senior practical physical chemistry, B (R. Chand & Co., Delhi)
2. K.K. Sharma and D. S. Sharma , An introduction to practical chemistry, (Vikas publishing, N. Delhi)
3. Vogel's text book of practical organic chemistry 5th edition
   S.S. Dara, Text book on Experiments and calculations in engineering chemistry.

Course outcomes:

The Student will be able to

1. Estimate the parameters like hardness and chloride content in water.
2. Determine the rate constant of a reaction from concentration – time relationships.
3. Measure the physical properties like adsorption and viscosity.
4. Evaluate the Rf values of some organic molecules by TLC technique.
5. Determine the partition coefficient of a organic compound in two immissible liquids

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. EEE	**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 & MIE)

Course Objectives:

The Student will

1. Geometrical approach to the mean value theorems and their application to the mathematical problems
2. Evaluate of improper integrals using Beta and Gamma functions.
3. Find maxima and minima of function of two and three variables
4. Evaluate of multiple integrals and their applications
5. Analyze physical quantities involved in engineering field related to vector valued functions

UNIT – I: CALCULUS:

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series. Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

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

Definitions of Limit and continuity. Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT – III: MULTIVARIABLE CALCULUS (INTEGRATION):

Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals), 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:

Vector point functions and scalar point functions. Gradient, Divergence and Curl.

Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT – V: VECTOR INTEGRATION:

Line, Surface and Volume Integrals.

Theorems of Green, Gauss and Stokes (without proofs) and their applications.

TEXTBOOKS:

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 textbook 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:

The Student will be able to

1. Solve the applications on the mean value theorems and evaluate the improper integrals using Beta and Gamma functions.
2. Examine for Maximum and minimum extreme values of functions of two variables with/ without constraints.
3. Evaluate the multiple integrals and apply the concept to find areas, volumes, center of mass and Gravity for cubes, sphere, and rectangular parallelepiped.
4. Compute partial derivatives, derivatives of vector-valued functions, gradient functions.
5. Evaluate the line, surface and volume integrals and converting them from one to another

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UGC AUTONOMOUS

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

(F120B) ENGLISH
(COMMON TO EEE, ME, ECE, CSE, IT & MIE)

Course Objectives:

The Student will

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
3. Develop study skills and communication skills in formal and informal situations.
4. Develop correct reading habits, silently, extensively, and intensively
5. Acquire the ability to use a suitable dictionary

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

TEXTBOOKS:

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:

The Student will be able to

1. Assess the nature of diffraction and use LSRW skills in his day to day life conversations.
2. Analyze the ideas in the construction field.
3. Design different models in manufacturing jeans.
4. Adapt balanced eating habits.
5. Focus on their career.

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B.Tech. EEE	**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:

The Student will be able to

1. Introduce the concept of electrical circuits using network laws and theorems.
2. Outline and analyse single phase A.C and three phase A.C circuits.
3. Study and understand magnetic circuits and transformers.
4. Understand the different types of D.C and A.C rotating electrical machine.
5. Understand basic Low Voltage Switchgear, Wiring, Protection and Batteries

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.

TEXTBOOKS:

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:

The Student 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. Acquire the knowledge on components of low voltage electrical installation.

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

(F123A) ENGINEERING DRAWING & COMPUTER GRAPHICS
(COMMON TO CE, EEE, CSE, IT & ECM)

Course Objectives:
The student will:

1. Develop the graphical skills for communication of concepts, ideas and design of engineering products through technical drawings.
2. Learn visual aspects of engineering drawing and graphics
3. Learn to use the techniques, skills, and modern engineering tools necessary for engineering practice
4. Learn conversion of Isometric Views to Orthographic Views
5. Understand the importance graphics in engineering.

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 solid

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)

TEXTBOOKS:

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), Textbook on Engineering Drawing, Scitech Publishers
2. Agrawal B. &Agrawal C. M. (2012), Engineering Graphics, TMH Publication.

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

(F120C) APPLIED PHYSICS
(COMMON TO EEE, ECE & ECM)

Course Objectives:
The Student will:

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 potential draw on knowledge in multiple areas of physics.
4. Study applications in engineering like memory devices, transformer core and electromagnetic machinery.
5. Learn various magnetic, dielectric properties and apply them in engineering applications

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

TEXTBOOKS:

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

REFERENCES:

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

Course outcomes:

The Student will be able to

1. Identify the behavior of a particles in quantum mechanics.
2. Describe classification of materials based on band theory of solids
3. Analyze the properties of semiconducting materials and devices.
4. Describe principles of fiber optics ,different types of fiber optics,laser and its applications .
5. Categorize various magnetic, dielectric properties and apply them in engineering applications.

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

(F1201) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB
(COMMON TO EEE, ME, ECE, CSE, IT & MIE)

Course Objectives:
The Student will:

1. Sensitize students to the nuances of English speech sounds, word accent, intonation, and rhythm
2. Bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
3. Improve the fluency of students in spoken English and neutralize their mother tongue influence
4. Use language appropriately for public speaking and interviews.
5. Develop to learn debating and oral presentation skills

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:*
i) Computers with Suitable Configuration

ii) 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..
The following course content is prescribed for the English for the English Language and Communication Skills Lab based on Unit -6 of AICTE Model Curriculum 2018 for B.Tech First English. As the syllabus is very limited, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning and timesaving in the lab.
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:**

REFERENCES:

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

Course Outcomes:

The Student will be able to

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

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B.Tech. EEE	**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:

The Student will:

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 characteristics of DC and AC electrical machines.
5. Learn the performance of various 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 ofa 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:

The Student will be able to

1. Demonstrate electrical circuits with basic electrical laws.
2. make use of different types of electrical circuits to different excitations.
3. Understand the measurement, calculation, and relation between the basic electrical parameters
4. Illustrate the basic characteristics of transformers.
5. test the performance of various electrical machines.

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

(F1202) APPLIED PHYSICS LAB
(COMMON TO EEE, ECE & ECM)

Course Objectives:

The Student will

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 on experimental knowledge in multiple areas of physics.
4. Study applications in engineering like Hall effect, Optical fibre, LASER, Photodiode and Solar cell.
5. Learn the phenomena of nano particle size in the materials science.

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 Wavelength 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).

TEXTBOOKS:

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

Course outcomes:

The Student will be able to:

1. Learn the experimental concepts on in LED, Electric and Electronic materials.
2. Get the knowledge of fundamentals of Semiconductor Lasers and fibre optics enable the students to apply to various systems like communications, photo cells and so on.
3. Design, characterization and study of properties of material help the students to p new materials for various engineering applications.
4. Exposed to the phenomena of electromagnetism and also to have exposure oı magnetic materials and dielectric materials.
5. Exposed to the phenomena of nano particle size in the materials science and engineering field.

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

(F210A) MATHEMATICS-III

(FOURIER SERIES AND COMPLEX ANALYSIS)

Course Objectives:

The Student will:

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 .

TEXTBOOKS:

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. 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:

The Student 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. EEE	**L**	**T-P-D**	**C**
II Year - I Semester	**3**	**0-0-0**	**3**

(F212A) ELECTRICAL CIRCUIT ANALYSIS

Course Objectives:

The Student will:

1. Impart knowledge on solving circuit equations using network theorems.
2. Find solution of first and second order networks.
3. Introduce Phasor diagrams and analysis of three phase circuits.
4. Analyse electric circuits using Laplace Transform.
5. Educate on Two Port Network and Network Functions.

UNIT I

Network Theorems: Superposition theorem, Thevenin theorem, Norton theorem, Maximum power transfer theorem, Reciprocity theorem, Compensation theorem.
Analysis with dependent current and voltage sources, Node and Mesh Analysis, Concept of duality and dual networks.

UNIT – II

Solution of First and second order networks: Solution of first and second order differential equations for Series and parallel R-L, R-C, RL-C circuits.
Initial and final conditions in network elements, forced and free response, time constants, steady state, and transient state response.

UNIT – III

Sinusoidal steady state analysis: Representation of sine function as rotating phasor, phasor diagrams, impedances and admittances, AC circuit analysis, effective or RMS values, average power, and complex power.
Three-phase circuits, Mutual coupled circuits, Dot Convention in coupled circuits, Ideal Transformer.

UNIT – IV

Electrical Circuit Analysis Using Laplace Transforms: Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform for standard inputs, convolution integral, inverse Laplace transform, transformed network with initial conditions.
Transfer function representation, Poles and Zeros, Frequency response (magnitude and phase plots), series and parallel resonances

UNIT – V

Two Port Network and Network Functions: Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters.
Transmission Parameters and hybrid parameters, interconnections of two port networks.

TEXTBOOKS:

1. M. E. Van Valkenburg, “Network Analysis”, Prentice Hall, 2006.
2. D. Roy Choudhury, “Networks and Systems”, New Age International Publications, 1998.
3. W. H. Hayt and J. E. Kemmerly, “Engineering Circuit Analysis”, McGraw Hill Education, 2013.

REFERENCES:

1. C. K. Alexander and M. N. O. Sadiku, “Electric Circuits”, McGraw Hill Education, 2004.
2. K. V. V. Murthy and M. S. Kamath, “Basic Circuit Analysis”, Jaico Publishers, 1999.

Course outcomes:

The student will be able to:

1. Apply network theorems for solving DC electric circuit equations.
2. Solve first and second order networks.
3. Analyse AC circuits using phasor diagrams.
4. Analyse electric circuits using Laplace Transform.
5. Understand Two Port Network and Network Functions.

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

(F214A) ELECTRONIC DEVICES AND CIRCUITS

Course Objectives:

The Students will:

1. understand operation of semiconductor devices.
2. understand Bi- polar Junction Transistor and its V-I characteristics.
3. understand Field Effect Transistors (FET) and its V-I characteristics.
4. understand the concept Biasing of transistors
5. understand the concept of Integrated circuit fabrication process.

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 Quiscent point from the CE characteristics, stability factors S, Introduction to fixed bias, Self-bias, collector to base bias. Transistor circuits for Quiscent 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, Monolythic circuit layout, chemical vapor deposition, sputtering, twin-tub CMOS process.

TEXTBOOKS:

1. ELECTRONC DEVICES AND CIRCUITS MILLMAN & HALKIAS McGraw HILL (Mandatory)
2. INTEGRATED ELECTRONICS MILLMAN & HALKIAS McGraw HILL
7.

REFERENCE BOOKS:

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

Course outcomes:

The student will be able to:

1. Understand the current voltage characteristics of semiconductor devices
2. Analyze current components in a junction Transistor
3. Design and analyze of electronic circuits
4. Evaluate frequency response to understand behavior of Electronics circuits.
5. Design of Integrated circuits.

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

(F212B) ELECTRICAL MACHINES – I

Course Objectives:

The Student will

1. Impart knowledge on magnetic circuit analysis.
2. study the construction and operation of DC Machine.
3. Familiar with the EMF equation, Torque equation, Armature circuit equation for motoring and generation.
4. Study the various characteristics of DC Machines and speed control methods.
5. Impart knowledge on construction, operation, types and testing of Transformer.

UNIT -I: Magnetic circuits basics

Magnetic fields and magnetic circuits: Review of magnetic circuits - MMF, flux, reluctance, inductance; review of Ampere Law and Biot Savart Law ,Electromagnetic force and torque: B-H curve of magnetic materials; flux-linkage vs current characteristic of magnetic circuits, linear and nonlinear magnetic circuits

Energy stored in the magnetic circuit; force as a partial derivative of stored energy with respect to position of a moving element; torque as a partial derivative of stored energy with respect to angular position of a rotating element.

UNIT-II: DC Machines

DC Machines: Basic construction of a DC machine, magnetic structure - stator yoke, stator poles, pole-faces or shoes, air gap and armature core, visualization of magnetic field produced by the field winding excitation with armature winding open, air gap flux density distribution, flux per pole.

Induced EMF in an armature coil, Armature winding and commutation – Elementary armature coil and commutator.

UNIT-III: Construction of DC Machine

: Lap and wave windings, construction of commutator, linear commutation Derivation of back EMF equation, armature MMF wave, derivation of torque equation, armature reaction, air gap flux density distribution with armature reaction.

DC machine - motoring and generation: Armature circuit equation for motoring and generation, Types of field excitations –separately excited, shunt and series.

UNIT – IV: Characteristics oF Dc machine

Open circuit characteristic of separately excited DC generator, back EMF with armature reaction, voltage build-up in a shunt generator, critical field resistance and critical speed.

V-I characteristics and torque-speed characteristics of separately excited, shunt and series motors. Speed control through armature voltage, Losses, load testing and back-to-back testing of DC machines.

UNIT –V: Transformers:

Transformers: Principle, construction and operation of single-phase transformers, equivalent circuit, phasor diagram, voltage regulation, losses and efficiency Testing - open circuit and short circuit tests, polarity test, back-to-back test, separation of hysteresis and eddy current losses Three-phase transformer - construction, types of connection and their comparative features, Parallel operation of single-phase and three-phase transformers.

Autotransformers – construction ,principle, applications and comparison with two winding transformer, Phase conversion - Scott connection, three-phase to six-phase conversion, Tap-changing transformers - No-load and on-load tap-changing of transformers, Three-winding transformers, Cooling of transformers.

TEXTBOOKS:

1. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
2. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.
3. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.

REFERENCE BOOKS:

1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.

Course outcomes:

The Student will be able to

1. Recollect magnetic field and magnetic circuit.
2. Explain the construction and operation of DC Machine.
3. Derive the EMF equation, Torque equation, Armature circuit equation for motoring and generation.
4. Demonstrate the various characteristics of DC Machines and speed control methods.
5. Summarize the construction, operation, types and testing of Transformer.

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

(F214F) ELECTROMAGNETIC FIELDS

Course Objectives:

The Student will:

1. Introduce the basic mathematical concepts related to electromagnetic vector fields.
2. Impart knowledge on the concepts of electrostatic fields, electrical potential, energy density and their applications.
3. Impart knowledge on the concepts of Magneto static fields, magnetic flux density, vector potential and its applications.
4. Gain concepts of different methods of emf generation and Maxwell's equations.
5. Understand concepts of Electromagnetic waves and characterizing parameters.

UNIT -I:

Review of Vector Calculus: Vector algebra addition, subtraction, components of components of vectors, scalar and vector multiplications, triple products, three orthogonal coordinate systems (rectangular, cylindrical and spherical). Vector calculus differentiation, Partial differentiation, integration, vector operator, gradient, divergence and curl; Integral theorems of vectors. Conversion of a vector from one coordinate system to another.

UNIT-II:

Static Electric Field:Coulomb's law, Electric field intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions, Gauss law and its applications, Absolute Electric potential, potential difference, calculation of potential differences for different configurations. Electricdipole, Electrostatic Energy and Energy density.

Conductors, Dielectrics and Capacitance: Current and current density, Ohms Law in Point form, Continuity of current, Boundary conditions of perfect dielectric materials. Permittivity of dielectric materials, Capacitance, Capacitance of a two-wire line, Poisson's equation, Laplace's equation, Solution of Laplaceand Poisson's equation, Application of Laplace's and Poisson's equations.

UNIT-III:

Static Magnetic Fields: Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, Scalar and VectorMagnetic potentials. Steady magnetic fields produced by current carrying conductors.

Magnetic Forces, Materials and Inductance: Force on a moving charge, Force on a differential current element, Force between differential current elements, Nature of magnetic materials, Magnetization and permeability, Magnetic boundary conditions, Magnetic circuits, inductances and mutual inductances.

UNIT – IV:

Time Varying Fields and Maxwell's Equations: Faraday's law for Electromagnetic induction, Displacement current.

Point form of Maxwell'sequation, Integral form of Maxwell's equations, Motional Electromotive forces. Boundary Conditions.

UNIT –V:

Electromagnetic Waves: Derivation of Wave Equation, Uniform Plane Waves, Maxwell's equation in Phasorform, Wave equation in Phasor form, Plane waves in free space and in a homogenous material.

Wave equation for a conducting medium, Plane waves in loss dielectrics, Propagation in good conductors, Skin effect, Poynting theorem.

TEXTBOOKS:

1. M. N. O. Sadiku, "Elements of Electromagnetics", Oxford University Publication, 2014.
2. A. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, New Delhi, 2009.
3. A. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.

REFERENCE BOOKS:

1. G. W. Carter, "The electromagnetic field in its engineering aspects", Longmans, 1954.
2. W. J. Duffin, "Electricity and Magnetism", McGraw Hill Publication, 1980.
3. W. J. Duffin, "Advanced Electricity and Magnetism", McGraw Hill, 1968.

Course outcomes:

The Student will be able to:

1. Understand the basic mathematical concepts related to electromagnetic vector fields.
2. Summarize the concepts of electrostatic fields, electrical potential, energy density and their applications.
3. Explain the concepts of Magneto static fields, magnetic flux density, vector potential and its applications.
4. Explain the concepts of different methods of emf generation and Maxwell's equations.
5. Understand the concepts of Electromagnetic waves and characterizing parameters.

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UGC AUTONOMOUS

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

(F2141) ELECTRONIC DEVICES AND CIRCUTS LAB
(COMMON TO ECE, ECM, EEE)

Course Objectives:

The Student will:

1. identify the basic electronic devices.
2. observe the characteristics of diodes like PN, Zener diode.
3. Be familiar with rectifiers and filters.
4. observe the characteristics of transistors, SCR & UJT.
5. 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:

The Students will be able to:

1. Analyze the diode and transistor characteristics.
2. Understand the principles of rectifier circuits using diodes and implement them using hardware.
3. Design the biasing circuits like self biasing.
4. Design various amplifiers like CE, CC, common source FET amplifiers and implement them using hardware and also observe their frequency responses.
5. Understand the concepts of SCR and observe its characteristics.
6. Understand the concepts of unipolar junction transistor and observe its characteristics.

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

(F2121) ELECTRICAL CIRCUITS LABORATORY

Course Objectives:

The Student will:

1. Develop the basic concepts of network analysis, which is the pre-requisite for all the electrical engineering subjects.
2. Solve different complex circuits using various network reduction techniques such as Source transformation, Network theorems etc.
3. Synthesize the transmission line parameters using two-port networks
4. Impart hands on experience in measurement of circuit parameters, study of circuit characteristics and simulation of time response.
5. Expose on the usage of CRO, power sources, function generator etc.

List of Experiments

1. Verification of Mesh and Nodal analysis.
2. Verification of Super Position theorem.
3. Verification of Thevenin's & Norton's theorem.
4. Verification of Maximum Power Transfer theorem.
5. Verification of Reciprocity theorem.
6. Verification of Compensation theorem.
7. Verification of Milliman's theorem.
8. Determination of transient response of current in RL and RC circuits.
9. Determination of self, mutual inductances and coefficient of coupling.
10. Frequency response of Series and Parallel resonance circuits.
11. Determination of Z and Y parameters.
12. Determination Transmission and hybrid parameters.
13. Locus diagrams of RL & RC series circuit.

Course outcomes:

The Students will be able to:

1. Become familiar with the basic circuit components and know how to connect them to make a real electrical circuit.
2. Verify the laws and principles of electrical circuits; understand the relationships and differences between theory and practice.
3. Gain the knowledge to solve transmission line networks and apply in designing the transmission lines
4. Carefully and thoroughly document and analyze experimental work.
5. Gain practical experience related to electrical circuits, stimulate more interest and motivation for further studies of electrical circuits.

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

(F2122) ELECTRICAL MACHINES LABORATORY - I

Course Objectives:

The Student will:

1. Expose the students to the operation of D.C. machines and transformers and give them experimental skill.
2. Conduct testing and experimental procedures on different types of electrical machines.
3. Practice different types of wiring and devices connections.
4. Analyze the operation of electric machines under different loading conditions.
5. Perform different experiments to obtain characteristic of machines.

List of Experiments

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Load test on DC shunt generator. Determination of characteristics.
3. Load test on DC series generator. Determination of characteristics.
4. Load test on DC compound generator. Determination of characteristics.
5. Hopkinson's test on DC shunt machines. Predetermination of efficiency.
6. Brake test on DC shunt motor. Determination of performance curves.
7. Swinburne's test and speed control of DC shunt motor. Predetermination of efficiencies.
8. Brake test on DC compound motor. Determination of performance curves.
9. Retardation test on DC shunt motor. Determination of losses at rated speed.
10. Separation of losses in DC shunt motor.
11. O.C. & S.C. Tests on Single-phase Transformer.
12. Parallel operation of Single-phase Transformer.
13. Scott connection of transformer.

Course outcomes:

The Student will be able to

1. Select a suitable measuring instrument for a given application.
2. Analyze the response of any electrical machine.
3. Conduct experiments on DC Machines to find the characteristics.
4. Troubleshoot the operation of an electrical machine.
5. Evaluate the performance of DC machines and Transformers.

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

(F210C) GENDER SENSITIZATION

Course Objectives:

The Student will:

1. Understand caste system
2. Learn women's work its politics and economics aware rebuilding lives.
3. Understand about relationships, responsibilities and gender identities

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.

TEXTBOOKS:

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

Course Outcomes:

The Student will be able to:

1. Describes the basic structure of caste system in India and the major four categories to which all castes could be come out of ignorance and archaic indoctrination to make the world a better place for both men and women
2. Have learnt to keep them safe and alive in the face of domestic violence
3. Learnt to maintain equality in gender. the student should have understand the responsibility of being good citizens overcoming social evils.

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

(F224A) DIGITAL ELECTRONICS
(Common to EEE)

Course Objectives:

The Student will:

1. Know the concepts of Combinational circuits.
2. Understand the concepts of flipflops, registers and counters.
3. Acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
4. Perform the analysis and design of various digital electronic circuits.
5. Understand the properties of memory units, RAM,ROM,PROM,EPROM,EEPROM

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.

TEXTBOOKS:

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 edition 2012.

Course outcomes:

The Student will be able to

1. Learn the basics of gates.
2. Construct basic combinational circuits and verify their functionalities
3. Apply the design procedures to design basic sequential circuits
4. Learn about counters and Shift registers
5. To understand the basic digital circuits and to verify their operation

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UGC AUTONOMOUS

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

(F222A) ELECTRICAL MACHINES – II

Course Objectives:

The Student will:

1. Pulsating and revolving magnetic fields.
2. Construction, operation, types, characteristics, and torque equation of Induction Motors.
3. Construction, principle of operation and performance of single-phase induction motors and special machines.
4. Construction and performance of salient and non–salient type synchronous generators.
5. Operation and characteristics of synchronous motor.

Unit I: Pulsating and revolving magnetic fields: Constant magnetic field, pulsating magnetic field - alternating current in windings with spatial displacement, Magnetic field produced by a single winding - fixed current and alternating current.
Pulsating fields produced by spatially displaced windings, Windings spatially shifted by 90 degrees, Addition of pulsating magnetic fields, Three windings spatially shifted by 120 degrees (carrying three-phase balanced currents), revolving magnetic field.

UNIT-II: Induction Machines: Construction, Types (squirrel cage and slip-ring), Torque Slip Characteristics, Starting and Maximum Torque, Equivalent circuit, Phasor Diagram, Losses and Efficiency. Effect of parameter variation on torque speed characteristics (variation of rotor and stator resistances, stator voltage, frequency).
Methods of starting, braking and speed control for induction motors, Generator operation. Self-excitation, Doubly-Fed Induction Machines.

UNIT-III: Single-phase induction motors: Constructional features double revolving field theory.
Equivalent circuit, determination of parameters. Split phase starting methods and applications. Special Motors: AC Series motor, Universal Motor, Shaded pole motor, Stepper motor

UNIT-IV: Synchronous machines: Constructional features, cylindrical rotor synchronous machine - generated EMF, equivalent circuit and phasor diagram, armature reaction, synchronous impedance, voltage regulation. Synchronization of Alternators with infinite bus – Methods of Synchronization- synchronizing power and torque –Parallel operation and load sharing – Numerical Problems –Effect of change of excitation and mechanical power input. Short circuit Analysis – determination of sub- transient, transient and steady state reactance's.

UNIT-V: Synchronous Motors: Construction and types of Synchronous Motors – Methods of Starting – Synchronous induction Motor. Variation of current and power factor with excitation control – phasor diagrams – V and Inverted V Curves. Synchronous condenser – Applications - Problems - Mathematical analysis for power developed. Excitation and power circles – hunting and its suppression

TEXTBOOKS:

1. 1 A.E. Fitzgerald and C. Kingsley, "Electric Machinery", McGraw Hill Education, 2013.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.

REFERENCES:

1. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
2. A. S. Langsdorf, "Alternating current machines", McGraw Hill Education, 1984.
3. P. C. Sen, "Principles of Electric Machines and Power Electronics", John Wiley &Sons,2007.

Course outcomes:

The Student will be able to:

1. Understand the concepts of rotating magnetic fields.
2. Identify different speed controlling techniques of Induction motor for the given application.
3. Acquire knowledge about the constructional details and principle of operation of three phase and single-phase induction motors.
4. Acquire knowledge about the working of synchronous machines as generators and motors
5. Acquire knowledge about testing and applications of synchronous machines.

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

(F222B) POWER ELECTRONICS

Course Objectives:

The Student will:

1. Different types of power semiconductor devices and their switching.
2. Understand characteristics and performance parameters of Thyristor rectifiers.
3. Understand switching techniques, basics topologies of DC-DC buck converters.
4. Understand Single phase voltage source converter.
5. Analyze different types of power semiconductor devices and their switching.

UNIT I: Power switching devices: Diode, Thyristor, MOSFET, IGBT: I-V Characteristics; Firing circuit for thyristor. Voltage and current commutation of a thyristor; Gate drive circuits for MOSFET and IGBT.

UNIT-II: Thyristor rectifiers: Single-phase half-wave and full-wave rectifiers, Single-phase full-bridge thyristor rectifier with R-load and highly inductive load. Three-phase full-bridge thyristor rectifier with R-load and highly inductive load; Input current wave shape and power factor.

UNIT-III: DC-DC buck converter: Elementary chopper with an active switch and diode, concepts of duty ratio and average voltage, power circuit of a buck converter, analysis and waveforms at steady state, duty ratio control of output voltage. DC-DC boost converter: Power circuit of a boost converter, analysis and waveforms at steady state, relation between duty ratio and average output voltage.

UNIT-IV: Single-phase voltage source inverter: Power circuit of single-phase voltage source inverter, switch states and instantaneous output voltage, square wave operation of the inverter. Concept of average voltage over a switching cycle, bipolar sinusoidal modulation and unipolar sinusoidal modulation, modulation index and output voltage.

UNIT-V: Three-phase voltage source inverter: Power circuit of a three-phase voltage source inverter. Switch states, instantaneous output voltages, average output voltages over a sub-cycle, three-phase sinusoidal modulation.

TEXTBOOKS:

1. M. H. Rashid, “Power electronics: circuits, devices, and applications”, Pearson Education India, 2009.
2. N. Mohan and T. M. Undeland, “Power Electronics: Converters, Applications and Design”, John Wiley & Sons, 2007.

REFERENCES:

1. R. W. Erickson and D. Maksimovic, “Fundamentals of Power Electronics”, Springer Science & Business Media, 2007.
2. L. Umanand, “Power Electronics: Essentials and Applications”, Wiley India, 2009.

Course outcomes:

The Student will be able to

1. Understand the differences between signal level and power level devices.
2. Analyse controlled rectifier circuits.
3. Analyse the operation of DC-DC choppers.
4. Analyse the operation of voltage source inverters.
5. Learn about the control of various converters.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

(F220C) MANAGEMENT SCIENCES

Course Objectives

The Student will:

1. understand the functions and responsibilities of managers
2. understand the operations management, marketing management & human resource Management
3. analyze and understand the environment of the organization
4. learn tools and techniques to be used in the performance of the managerial job.
5. develop cognizance of the importance of management principles

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: *X* chart, R chart, c chart, pchart, Quality, Deming principles, EOQ, ABC Analysis, VED Analysis. TQM, JIT, BPR, SixSigma.

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, Compensation, Leadership, Leadership styles, Motivation, Groups & Teams.

UNIT V

Marketing Management

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

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

REFERENCE BOOKS:

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 Feb 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:** Mc Graw Hill India; 5 edition(2013)

Course Outcomes:

The Student will be able to:

1. Analyze the demand and supply conditions and assess the position of a firm
2. Give an idea on different types of markets, strategic pricing, capital budgeting estimation and techniques, for the financial performance
3. Learn the concept of Management, organization, Human Resource management to meet the global challenges for decision making.
4. Understand the operational and project management techniques for critical decision making
5. Understand the meaning of materials management and are able to manage and plan material flows and related information

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

(F220D) BIOLOGICAL SCIENCES

Course Objectives:

The Student will:

1. understand the basics of biology such as cell structure and functions.
2. understand the inheritance & evolution.
3. understand the Systems of Life-Digestion.
4. understand the systems of human life.
5. learn the basic concepts of genetics, and an introduction to microbiology.

UNIT - I: Basic Biology

Introduction, Living organisms, Cell structure and Organelles, Organogenesis.

UNIT - II: Human Anatomy

Systems of Life-Digestion, Respiration, Circulation, Excretion, Reproduction, and Nervous system.

UNIT - III: Biochemistry

Diet and Nutrition- Macro (Carbohydrates, proteins, lipids) - and Micronutrients (vitamins), Essential minerals and their role; deficiency symptoms; and their role; deficiency symptoms.

UNIT - IV: Microbiology

Microorganisms-Classification 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, Transcription and Translation, gene expression and regulation

TEXTBOOKS:

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

REFERENCE BOOKS:

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

Course Outcomes:

The Student 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. EEE	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-2-0**	**1**

(F2221) DIGITAL ELECTRONICS LAB

Course Objectives:

The Student will:

1. know the concepts of Combinational circuits.
2. understand the concepts of flipflops, registers and counters.
3. understand characteristics of memory and their classification.
4. To understand concepts of sequential circuits and to analyze sequential systems in terms of state machines
5. illustrate different electronic circuits and their application in practice.

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 (74LS73}.
2. Decade counter (74LS90) and UP-Down Counter (74LS192).
3. Universal Shift registers- 74LS194/ 195. 4. 3-8decoder-74LS138.
5. 4-bit comparator 74LS85.
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, FullAdder 3. 3-8 Decoders-74138.
4. 8 x 1 Multiplexer-74X151
5. 2x4Demultiplexer-74X155
6. 4 bitComparator-74X85.
7. D Flip-Flop74X74.
8. Decadecounter-74X90.

For Software Simulation

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

Course Outcomes:

The Student will be able to:

1. Learn the basics of gates.
2. Construct basic combinational circuits and verify their functionalities
3. Apply the design procedures to design basic sequential circuits
4. Learn about counters and Shift registers

understand the basic digital circuits and to verify their operation

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UGC AUTONOMOUS

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

(F2222) ELECTRICAL MACHINES LABORATORY – II

Course Objectives:

The Student will:

1. Understand the performance of single-phase transformer.
2. Understand the performance of parallel operation of transformer.
3. Understand the performance of induction motor.
4. Understand the regulation of alternator and equivalent circuit of single-phase induction motor.
5. Understand operation and measurement of Sequence impedance of 3-phase alternator.

List of Experiments

1. Separation of core losses of a single-phase transformer
2. Sumpner's test on a pair of single-phase transformers
3. Brake test on three phase Induction Motor.
4. No-load & Blocked rotor tests on three phase Induction motor Methods.
5. V and Inverted V curves of a three-phase synchronous motor.
6. Regulation of three-phase alternator by E.M.F and M.M.F methods
7. Equivalent Circuit of a single-phase induction motor.
8. Determination of $X_d$and $X_q$of a salient pole synchronous machine.
9. Regulation of three-phase alternator by Z.P.F. and A.S.A methods.
10. Efficiency of a three-phase alternator.
11. Measurement of sequence impedance of a three-phase alternator.

Course Outcomes:

The Student will be able to:

1. Acquire hands on experience of conducting various tests on alternators and obtaining their performance indices using standard analytical as well as graphical methods.
2. Acquire hands on experience of conducting various tests on induction machines and obtaining their performance indices using standard analytical as well as graphical methods.
3. Calculate the efficiency of the single-phase transformer, three phase induction motor, and alternator.
4. Know the parallel operation of single-phase transformer.
5. Calculate the Efficiency of three phase alternator.

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UGC AUTONOMOUS

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

(F2223) POWER ELECTRONICS LABORATORY

Course Objectives:

The Student will:

1. Simulate and design various gate firing circuits.
2. Learn the operation and characteristics of power semiconductor devices and passive components, their practical application in power electronics
3. Understand the operating principles, design and synthesis of different power electronic converters.
4. Familiarize the students by introducing Pspice and MULTISIM and help them to simulate and analyze different Converters.
5. Enable the student to study and simulate various Chopper Circuits using MATLAB

List of Experiments

1. Study of Characteristics of SCR, MOSFET & IGBT.
2. Gate firing circuits for SCR's.
3. Single Phase AC Voltage Controller with R and RL Loads.
4. Single Phase fully controlled bridge converter with R and RL loads.
5. Forced Commutation circuits (Class A, Class B, Class C, Class D & Class E).
6. DC Jones chopper with R and RL Loads.
7. Single Phase Parallel, inverter with R and RL loads.
8. Single Phase Cyclo converter with R and RL loads.
9. Single Phase Half controlled converter with R load.
10. Three Phase half controlled bridge converter with R-load.
11. Single Phase series inverter with R and RL loads.
12. Single Phase Bridge converter with R and RL loads.
13. Single Phase MC Murry Bed fort inverter.
14. Simulation of single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads.
15. Simulation of resonant pulse commutation circuit and Buck chopper.
16. Simulation of single phase Inverter with PWM control.

Course Outcomes:

The Student will be able to:

1. Use the techniques, skills and modern engineering tools necessary for engineering practice.
2. Identify, formulate and sole engineering problems with simulation.
3. Simulate characteristics of SCR, MOSFET, and IGBT.
4. Simulate Gate firing circuits, Rectifier, Chopper, Inverter and AC Voltage Controller.
5. Simulate Cyclo-Converter and calculate harmonics.

5.

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UGC AUTONOMOUS

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

(F220F) ENVIRONMENTAL SCIENCE

Course Objectives:

The Student will:

1. Know the importance of Environment is a key to the future of mankind.
2. Global warming, the depletion of ozone layer and loss of biodiversity have made everyone aware of environmental issues
3. Study of environmental studies encourages students to explore the social, aesthetic, ethical, scientific, and technical aspects of environmental issues.
4. Apply modelling to understand the behaviour make predictions for future and plan management in view of changing environmental conditions.
5. Know the Concept of Sustainable Development.

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

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

impact assessment methodologies. Environmental management plan (EMP).

UNIT - III:

Environmental Policy, Legislation, Rules and Regulations: 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.

TEXTBOOKS:

1. TEXT BOOK OF ENVIRONMENTAL Science and Technology by M.Anji Reddy2007
2. Principles of Environmental Science and Engineeringby P.Venugopal Rao.
3. Introduction to Environmental Studies by K.Mukkanti
4. Text book of Environmental studies by Kaushik & Anubha kaushik

REFERENCE BOOKS:

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

Course outcomes:

The Student will be able to:

1. Identify the importance of natural resources and use them efficiently.
2. Support and conserve the biodiversity.
3. Imply environment plan in developing in any sort of environmental projects.
4. Apply the environmental legislation in every walk of life and reserve the natural resources for future generations in sustainable manner.
5. Solve the sources and risks caused by pollution.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

(F312A) POWER SYSTEMS – I

Course Objectives:

The Student will:

1. Understand the working of power generating stations and sub systems
2. Examine A.C. and D.C. distribution systems.
3. Understand classification of substations and examine Air insulated substations and Gas insulated substations.
4. Understand different types of tariffs and economical aspects of power generation.
5. Understand concepts of Power factor correction and voltage control.

UNIT-I: Power Stations: Thermal Power Stations

Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses. Brief description of TPS components: -Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and cooling towers.

Hydel Power Stations- Schematic Arrangement, Brief description of Hydraulic Structures, Water turbines.

Nuclear Power Stations- Nuclear Fission and Chain reaction, Nuclear fuels, Principle of operation of Nuclear reactor, Reactor Components- Moderators, Control rods, Reflectors and Coolants, Radiation hazards- Shielding and Safety precautions, Types of Nuclear reactors and brief description of PWR, BWR and FBR.

Gas Power Stations- Principle of Operation and Components (Block Diagram Approach Only).

UNIT-II: D.C & A.C Distribution Systems:

D.C Distribution Systems Classification of Distribution Systems - Comparison of DC vs. AC and Under-Ground vs. Over - Head Distribution Systems- Requirements and Design features of Distribution Systems- Voltage, Drop Calculations (Numerical Problems in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal voltages) and Ring Main Distributor.

A.C Distribution Systems-Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to related load voltages.

UNIT-III: Air Insulated & Gas Insulated (Gis) Substations

Classification of Substations: - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment.

Bus BarArrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams.

Gas Insulated Substations (Gis)-Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, busbar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

UNIT-IV: Power Factor

Causes of low power factor -Methods of Improving power factor -Phase advancing and generation of reactive KVAR using static Capacitors - Most economical power factor for constant KW load and constant KVA type loads, Numerical Problems

UNIT-V: Economic Aspects of Power Generation & Tariff

Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, utilization and plant use factors- Numerical Problems. Tariff Methods: Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. Desirable Characteristics of a Tariff Method-Tariff Methods: Flat Rate, Block- Rate, two-part, three-part, and power factor tariff methods and Numerical Problems.

TEXTBOOKS:

1. A.Chakrabarthi, M.L.Soni, P.V.Gupta and M.I Soni, Dhanpath Rai and Sons "A Text Book on Power System Engineering."
2. C.L.Wadhwa, New Age International, "Generation, Distribution and Utilization of Electrical Energy"
3. V.K.Mehta and Rohit Mehta, S.Chand Company Pvt. Ltd , "Principles of Power Systems".
4. J.B.Gupta, S.K.Kataria& Sons. "A course in Power Systems"

REFERENCES:

1. R.K. Rajput, "A Text book of Power system Engineering," Laxmi Publications (P) Limited.
2. S.N.Singh', "EIectrical Power Generation,Transmission and Distribution," PHI.
3. C.L.Wadhawa "Eletrical Power Systems" New Age International (P) Limited, Publishers.
4. Dr. B.R. Gupta,"Generation of Electrical Energy," S. Chand Publications

Course outcomes:

The Student will be able to:

1. Understand the concepts of generating stations, substations, tariff systems.
2. Apply concepts in distribution systems to solve problems.
3. Analyze economics of power generation and Power factor correction
4. Evaluate the power tariff methods.
5. Know the importance of Power factor improvement and voltage control.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

(F312B) CONTROL SYSTEMS

Course Objectives:

The Student will

1. Understand the applications of control systems in day life.
2. Represent the system with different ways such as transfer function, state space model
3. Assess the system performance using time domain analysis
4. Improve the performance of the system using frequency domain analysis
5. Design the stable systems using compensation techniques

UNIT-I: Mathematical Modeling of Physical Control Systems

Basic elements of control system –Classification–Open and closed loop systems: Position Control Systems, Temperature control of a chamber, Liquid level control, Aircraft wing control system, Missile direction Control system,– Transfer function– Mathematical Modeling of Electrical, Mechanical, electro mechanical Systems and Thermal Systems. Mathematical modeling of Synchros – AC and DC servomotors– Block diagram Algebra– Signal flow graphs, Mason‘s gain Formula

UNIT-II: 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-III: 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-IV: 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

UNIT-V: State Space Analysis of Continuous Systems

State variables–State variable representation of continuous time system–state equations– transfer function from state variable representation–Solutions of the state equations– Concepts of Controllability and observability and techniques to test them

TEXT BOOKS:

1. I.J.NagrathandM.Gopal,"ControlSystemsEngineering",NewAgeInternational Publishers,2007.
2. Benjamin C. Kuo, "Automatic Control systems, Pearson Education,"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:

The Student will be able to

1. Describe the system in state space model using MATLAB
2. Determine the time response of systems and to design the controllers
3. Analyse the system stability using Routh-Hurwitz Criteria and root locus
4. Sketch the system stability in frequency domain using Bode plot and Nyquist plot.
5. Derive the mathematical model and transfer function of any electrical and mechanical systems

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UGC AUTONOMOUS

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

(F312C) ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

Course Objectives:

The Student will:

1. Illustrate various working principles used in various instruments.
2. Select suitable instrument for measuring Power, Power factor and Frequency.
3. Identify various errors in Energy meter and compensation techniques for minimizing them.
4. Understand the concepts of measuring electrical circuit parameters.
5. Understand the working of various transducers.

UNIT-I: Analog Ammeters, Voltmeters, and Instrument Transformers

Classification of analog instruments–PMMC and MI Instruments: Principle, construction, Torque equation, Range Extension, Effect of temperature, Errors, advantages and disadvantages.

Current Transformer and Potential Transformer: Construction, theory, Phasor diagram, Errors, testing and applications.

UNIT-II: Wattmeter, Power Factor Meter and Frequency Meters

Electro dynamo meter type Wattmeter: Construction, Theory, Shape of scale, errors– Low power factor wattmeter– Three phase wattmeter – Measurement of active and reactive power in single phase and three phases.

Single phase and three phase electro dynamometer type and MI type power factor meters – Electrical resonance and Weston type frequency meters.

UNIT-III: Energy Meter and Potentiometers

Single phase induction type energy meter: Construction, theory, operation, errors, compensations, Maximum demand indicators–Measurement of VAH, VARh.

Basic Potentiometer–Standardization–Crompton‘s Potentiometer–Polar type and coordinate type AC potentiometers–Applications of DC& AC potentiometer.

UNIT-IV: DC & AC Bridges

Classification of resistances–Wheatstone bridge–Sensitivity of Wheatstone bridge–Limitations–Carey foster slide wire bridge–Kelvin‘s Double bridge–Difficulties in measurement of high resistances–loss of charge method–Megohm bridge method–measurement of earth resistances.

Measurement of Inductance and capacitances: Maxwel‘s Bridge–Anderson ‘s Bridge–Hays Bridge–Owen ‘s Bridge–Desauty’s Bridge–Schering bridge.

Measurement of Mutual inductance: Campbell ‘s Heaviside bridge–Carey foster bridge–Campbell ‘s bridge–Measurement of frequency: Wien ‘s Bridge

UNIT-V: Transducers

Transducers: Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of resistor, inductor, LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermostats, Thermocouples, Synchros, Piezo electric transducers, photovoltaic, photo conductive cells, photo diodes

TEXTBOOKS:

1. 1. K. Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation", DhanapathRai and Sons.,10thEdition, 2007.
2. J.B. Gupta," A course in Electronics and Electrical Measurements and Instrumentation", S. K. Kataria & Sons, 2009.
3. H.S. Kalsi," Electronic Instrumentation", Tata McGraw Hill,2004.
4. D.V.S Murthy, "Transducers and Instrumentation", Prentice Hall of India

REFERENCES:

1. 1. U. A. Bakshi, A. V. Bakshi" Electrical Measurements and Instrumentation", Technical Publications, 2009
2. E.W. Golding &F.C. Widdis, "Electrical Measurements & Measuring Instruments",A.H. Wheeler &Co, Fifth Edition,2001
3. A.S Morris, "Principles of Measurement and Instrumentation", Pearson /Prentice Hall of India

Course outcomes:

The Student will be able to:

1. Compare performance of MC & MI Instruments and Compute the errors in CTs and PTs.
2. Understand operating principles of Electro dynamo type instruments and frequency meters.
3. Understand operating principles of Induction type instruments and comparison instruments.
4. Determine the circuit parameters using AC and DC bridges.
5. Identify instruments for Transducers.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

(F314J) MICROPROCESSORS AND MICROCONTROLLERS

Course Objectives:

The Student will

1. Understand the basic 16-bit microprocessor architecture and its functionalities.
2. Develop the microprocessor-based programs for various applications.
3. Make the interfacing in between microprocessor and various peripherals.
4. Develop the microcontroller-based programs for various applications.
5. Understand basic feature of 8051 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

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, interrupts service routine.

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

UNIT-IV: Introduction to Microcontrollers

Overview of 8051 microcontroller, architecture, I/O ports, memory organization, addressing modes and instruction set of 805, simple programs.

UNIT-V: 8051 Real Time Control

Programming time interrupts, programming external hardware interrupts, and programming the serial communication interrupts, programming 8051 Timers and counters.

TEXTBOOKS:

1. 1. D.V.Hall, “Microprocessors and Interfacing”, Tata Mc Graw-Hill Publishing Company,2nd Edition2006.
2. Kenneth.J.Ayala, The 8051 Microcontroller, 3rd Edition., EngageLearning.

REFERENCES:

1. A.K.Ray and K.M Bhurchandani, “Advanced Microprocessors and peripherals”-TMH,2nd Edition 2006.
2. K.UmaRao, AndhePallavi “The 8051 Microcontrollers. Architecture and programming and applications”- Pearson,2009.
3. Duand GA Gibson “Microcomputer system 8086/8088 family architecture. Programming and design”- PHI 2nd Edition.

Course outcomes:

The Student will be able to

1. Analyse 8086 microprocessors architectures and its functionalities.
2. Design 8086 Microprocessor based systems for real time applications using programming languages like Assembly Language and MASM.
3. Interface and program external peripherals and I/O devices to 8086 microprocessors.
4. Explain the basics of 8051 microcontroller’s architecture and its functionalities.
5. Design microcontroller-based projects for real time applications.

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

(F310B) MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

Course Objectives:

The Student will:

1. Gain knowledge of demand, demand elasticity & demand forecasting by using statistical techniques for any hypothetical enterprise.
2. Assess the cost behaviour, costs useful for managerial decision making and determine Break Even Point (BEP) of an enterprise.
3. Differentiate & distinguish price and output decisions in different market structures i.e., perfect, monopoly, monopolistic & Oligopoly competition.
4. Know the meaning, importance, steps, methods, uses & limitations of Capital Budgeting Analysis and rank various projects under Pay Back, ARR, NPV, PI & IRR methods.
5. Identify & explain the process & principles of accounting and to maintain Journal, Ledger, Trial Balance, Manufacturing A/c, Trading A/c., Profit & Loss A/c. and Balance Sheet of any business undertaking

UNIT-I: Introduction & 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: Markets & New 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. Business: Features and evaluation of different forms of Business

Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, New Economic Environment: Changing Business Environment in Post-liberalization scenario.

UNIT-IV: Capital Budgeting

Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital - Trading Forecast, Capital Budget, Cash Budget. Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of return (ARR) and Net Present Value Method (simple problems).

UNIT-V: Introduction to Financial Accounting & Financial Analysis:

Accounting concepts and Conventions - Introduction IFRS - Double - Entry Book Keeping, Journal, Ledger, Trial Balance - Final Accounts (Trasing Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios. Du Pont Chart.

TEXTBOOKS:

1. Varshney & Maheswari,"Managerial Economics, Sultan Chand", 2009.
2. S.A. Siddiqui & A.S. Siddiqui, "Managerial Economics and Financial Analysis", New Age international Publishers, Hyderabad 2013.
3. M. Kasi Reddy & Saraswathi, "Managerial Economics and Financial Analysis", PHI New Delhi, 2012.

REFERENCES:

1. 1. Ambrish Gupta, "Financial Accounting for Management", Pearson Education, New Delhi, 2012.
2. H. Craig Peterson & W. Cris Lewis, "Managerial Economics", Pearson, 2012.
3. Lipsey& Chrystel, "Economics", Oxford University Press, 2012

Course outcomes:

The Student will be able to:

1. Predict the demand for a product or product mix of a company & to analyze various factors influencing demand elasticity.
2. Examine optimum production & cost functions with the help of mathematical equations & by developing graphical solutions through linear programming applications.
3. List features, steps, merits, uses & limitations of Pay Back, ARR, NPV, PI & IRR methods of Capital Budgeting and compute rank of the projects.
4. Discuss the process & principles of accounting and prepare Journal, Ledger, Trial Balance, Manufacturing A/c, Trading A/c., Profit & Loss A/c. and Balance Sheet of an enterprise
5. Know how to analyze and interpret the financial statements through ratio analysis.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

(F3121) ELECTRICAL SIMULATION LAB-I

Course Objectives:

The Student will:

1. Solve, Simulate and Analyse basic Electrical Circuits
2. Develop hands on working experience with reference to Solve, Simulate and Analyse Electrical Circuits using PSPICE environment.
3. provide students with a strong background/hands-on experience on PSPICE
4. Enable the student on how to approach for solving Engineering problems using simulation tools.
5. Develop, Simulate and Analyse various AC circuits

EXPERIMENT 1: Simulation of Mesh Analysis & Nodal Analysis.

EXPERIMENT 2: Simulation of Thevenin 's & Norton's Theorem

EXPERIMENT 3: Simulation of Maximum Power Transfer Theorem

EXPERIMENT 4: Simulation of Superposition & Reciprocity Theorem

EXPERIMENT 5: Simulation of Compensation & Milliman's Theorem.

EXPERIMENT 6: Simulation of Z and Y Parameters.

EXPERIMENT 7: Simulation of Transmission and hybrid parameters.

EXPERIMENT 8: Simulation of Poles-zero Analysis of Electrical Circuit

EXPERIMENT 9: Power Measurement by 2 wattmeter method

EXPERIMENT 10: Reactive power Measurement using single wattmeter method.

EXPERIMENT 11: DC transient analysis of Electric circuit.

EXPERIMENT 12: Star to Delta and Delta to star transformation

Course outcomes:

The Student will be able to

1. Identify the applications of theorems
2. Understand the main features and importance of the PSPICE environment.
3. Apply working knowledge of PSPICE package to simulate and solve Electrical Circuits and Applications.
4. Solve, Simulate and Analyse various DC circuits.
5. Understand 3-phase ac circuit basic concepts and can apply for solving complex electrical engineering problems

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UGC AUTONOMOUS

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

(F3122) CONTROL SYSTEMS LAB

Course Objectives:

The Student will

1. Understand and practice the modelling, simulation, and implementation of a physical dynamical system by a linear time invariant ordinary differential equation, to highlight the electrical modelling of a second order system and analyze the under-damped, over-damped and critically damped cases
2. Study the effects of poles and zeros location in the s-plane on the transient and steady state behaviour, to study the effects of Lead, Lag and Lag-Lead series compensator on a second order system transient and steady state system response
3. Familiarize with Servomotor. To implement the basic principles of Servo-Motor calibration.
4. Investigate the Servo-Motor speed and position control principles by designing and selecting specific P, I and PI gains for specific responses.
5. Experimentally determine the transfer function of a Servomotor using the PC software, Servo-Motor Hardware and skills and techniques learned

EXPERIMENT 1: Time response of Second order system

EXPERIMENT 2: Characteristics of Synchros

EXPERIMENT 3: Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions

EXPERIMENT 4: Transfer function of DC motor

EXPERIMENT 5: Effect of P, PD, PI, PID Controller on a second order systems

EXPERIMENT 6: Lag and lead compensation – Magnitude and phase plot

EXPERIMENT 7: Transfer function of DC generator

EXPERIMENT 8: Temperature controller using PID controller

EXPERIMENT 9: Characteristics of Magnetic amplifiers

EXPERIMENT 10: Characteristics of AC servo motor

EXPERIMENT 11: Position control of D.C servo motor.

EXPERIMENT 12: Speed control of D.C servo motor.

Course outcomes:

The Student will be able to

1. Demonstrate what they have learned theoretically in the field of control engineering using both analogy and digital techniques, demonstrate the ability to apply Laplace transform, transfer functions, modelling RLC circuit, block diagrams for simulation and control.
2. Apply knowledge of mathematics, science, and engineering, demonstrate the ability to interact and communicate effectively with peers in the group.
3. Function on multi-disciplinary teams, demonstrate an ability to communicate effectively, demonstrate an ability to use the acquired analogy and digital control skills to identify, evaluate and solve control engineering problems.
4. Identify, formulate, and solve engineering problems, demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
5. Demonstrate some practical experience in control engineering which might become a research point of interest in their field of study, demonstrate some experience in engineering practice and undergraduate research

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

(F3123) ELECTRICAL MEASUREMENTS LAB

Course Objectives:

The Student will

1. Monitor, analyze any physical system.
2. choose the suitable method for measurement of active, reactive powers.
3. Understand students how different types of meters work and their construction.
4. Apply the suitable bridge for measurement of resistance, inductance and capacitance.
5. Examine calibration of LVDT

EXPERIMENT 1: Calibration and testing of 1- Φ Energy meter

EXPERIMENT 2: Calibration of dynamometer type Power Factor meter.

EXPERIMENT 3: Measurement of Unknown voltage by DC Crompton potentiometer.

EXPERIMENT 4: Measurement of Low resistance by using Kelvin‘s double bridges

EXPERIMENT 5: Measurement of Iron losses by using Lloyd, Fisher magnetic method

EXPERIMENT 6: Measurement of unknown capacitance by using Schering bridge.

EXPERIMENT 7: Measurement of Inductance by using Anderson bridge

EXPERIMENT 8: Measurement of 3-Φ reactive power with volt ampere method

EXPERIMENT 9: Measurement of parameters of choke coil using three voltmeter and three Ammeter methods

EXPERIMENT 10: Linear variable differential transformer (LVDT) trainer and capacitance pickup Characteristics and calibration

EXPERIMENT 11: Measurement of unknown inductance by using Maxwell‘s bridge.

EXPERIMENT 12: Resistance strain guage

EXPERIMENT 13: PT testing by comparison

EXPERIMENT 14: CT testing using mutual inductor

EXPERIMENT 15: Performance of oil by using Dielectric oil testing method

Course outcomes:

The Student will be able to

1. Measure various electrical parameters with accuracy, precision, resolution.
2. Make use of AC and DC bridges for relevant parameter measurement.
3. Test current transformers and dielectric strength of oil.
4. Ability to balance Bridges to find unknown values.
5. Demonstrate & Calibrate LVDT and resistance strain gauge.

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UGC AUTONOMOUS

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

(F322A) POWER SYSTEMS-II

Pre- requisites: Power Systems-I

Course Objectives

The Student will

1. Design over-head transmission lines.
2. Analyze the performance of transmission lines.
3. Understand the concept of transients in over-head transmission lines.
4. Observe the different effects in over-head transmission lines like skin, proximity, Ferranti, corona, and radio interference effects on over-head transmission lines.
5. Know the Concepts of underground cables – construction, types, insulation, grading and capacitance calculations.

UNIT – I: Transmission Line Parameters

Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

UNIT–II: Performance of Short, Medium and Long Length Transmission Lines

Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie A, B, C, D Constants for symmetrical & Asymmetrical Networks, Numerical Problems. Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems.

Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numerical problems).

UNIT-III: Power System Transients

Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Incident, Reflected and Refracted Waves- Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions (Numerical Problems).Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples).

UNIT- IV: Factors Governing the Performance of Transmission Lines, Transmission Line Insulators, Sag and Tension Calculations

Skin and Proximity effects - Description and effect on Resistance of Solid Conductors, Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.

Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.
Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

UNIT – V: Underground Cables
Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading.

TEXTBOOKS:
1. C.L.Wadhwa,Electrical power systems, New Age International (P) Limited, Publishers.
2. PSR, Murthy, "Electrical Power Systems,"BS Publications.

REFERENCE BOOKS:
1. M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy,"A Text Book on Power System Engineering" Dhanpat Rai & Co Pvt. Ltd.
2. R. K. Rajput, "A Textbook of Power System Engineering," Laxmi Publications (P) Limited.
3. S. N. Singh "Electrical Power Generation, Transmission and Distribution," PHI.
4. V. K. Mehta and Rohit Mehta "Principles of Power Systems," S. Chand Company Pvt. Ltd.
5. I.J.Nagarath and D.P.Kothari, "Power System Engineering," TMG.
6. Dr. B. R. Gupta,"Power System Analysis and Design," S. Chand & Company Limited.
7. Abhijit Chakrpabarti, SunithaHalder, "Power System Analysis, Operation and control," PHI, 3/e,2010.
8. TuranGonen, "Electrical Power Transmission system engineering Analysis and design" CRC Press (Taylor & Francis Group) Special Indian Edition.

Course Outcomes
The Student will be able to:
1. Understand the methods of finding transmission line parameters & modeling of lines and their performance.
2. Apply performance criteria to models of short, medium and long lines, determine the values of A, B, C, D parameters.
3. Analyze transient performance of transmission lines.
4. Understand the mechanical design such as overview of line supports, insulators, sag& Tension calculations. Explain skin, proximity, Ferranti, Corona & Radio Interference effects.
5. Understand the constructional aspects and grading of underground cables, to find out the capacitance of single core & 3 core belted cables and their IR values.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

(F322B) COMPUTER METHODS IN POWER SYSTEMS
(PROFESSIONAL ELECTIVE-I)

Course Objectives

The Student will;

1. Provide the students in getting basic idea of different computer methods in power systems
2. Format the Z bus of a transmission line, power flow studies by various methods.
3. Deal the short circuit analysis and analysis of power system for steady state and transient stability.
4. Analyse the Load flows using different methods.
5. Gain solid foundation in mathematical and engineering fundamentals required to solve engineering problems.

UNIT – I: Power System Network Matrices-1:

Graph Theory: Definitions, Bus Incidence Matrix, Y_{bus} formation by Direct and Singular Transformation Methods, Numerical Problems. Power System Network Matrices-2

Formation of Z_{Bus}: Partial network, Algorithm for the Modification of Z_{Bus} Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems).-Modification of $Z_{Bus}$for the changes in network.

UNIT – II: Power Flow Studies-1:

Necessity of Power Flow Studies – Data for Power Flow Studies – Derivation of Static load flow equations – Load flow solutions using Gauss Seidel Method: Acceleration Factor, Load flow solution with and without P-V buses, Algorithm and Flowchart. Numerical Load flow Solution for Simple Power Systems (Max. 3-Buses): Determination of Bus Voltages, Injected Active and Reactive Powers (Sample One Iteration only) and finding Line Flows/Losses for the given Bus Voltages.

Power flow Studies-2

Newton Raphson Method in Rectangular and Polar Co-Ordinates Form: Load Flow Solution with or without PV Busses- Derivation of Jacobian Elements, Algorithm and Flowchart.

Decoupled and Fast Decoupled Methods. - Comparison of Different Methods – DC load Flow.

UNIT – III: Short Circuit Analysis-1:

Per-UNIT - System of Representation. Per-UNIT - equivalent reactance network of a three phase Power System, Numerical Problems.

Symmetrical faultAnalysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors, NumericalProblems.

Short Circuit Analysis-2: Symmetrical Component Theory: Symmetrical Component Transformation, Positive, Negative and Zero sequence components: Voltages, Currents and Impedances.

Sequence Networks: Positive, Negative and Zero sequence Networks, Numerical Problems. Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without fault impedance, Numerical
Problems

UNIT – IV: Power System Steady State Stability Analysis:

Elementary concepts of Steady State, Dynamic and Transient Stabilities. Description of: Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State Stability and Methods to improve steady state stability.

UNIT – V: Power System Transient State Stability Analysis:

Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation. - Solution of Swing Equation: Point-by-Point Method. Methods to improve Stability - Application of Auto Reclosing and Fast Operating Circuit Breakers.

TEXTBOOKS

1. Abhijit Chakrabarthi, Sunita Haldar "Power system Analysis Operation and control,", 3rd edition, PHI,2010.
2. N V Ramana, "Power Systems Operation and Control" Pearson, India.
3. I.J. Nagrath & D.P.Kothari "Modern Power system Analysis" TataMcGraw-Hill Publishing company, 2nd edition
4. K.Umarao, I.K. International "Computer techniques and models in power systems"

REFERENCE BOOKS

1. M.A.Pai, "Computer Techniques in Power System Analysis",-TMH Publications
2. Grainger and Stevenson "Power System Analyses", Tata McGraw Hill.

Course Outcomes

The Student will be able to:

1. Demonstrate analyse of the nature of the modern power system, including the behaviour of the constituent components and sub-systems.
2. Describe the construction, operation, and equivalent circuit of three-phase transformers.
3. Apply load flow analysis to an electrical power network and interpret the results of the analysis.
4. Analyze a network under both balanced and unbalanced fault conditions and interpret the results.
5. Demonstrate and analyze the role of protection in modern power systems and to describe the operation of a range of protection schemes.

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

(F322C) HIGH VOLTAGE ENGINEERING
(PROFESSIONAL ELECTIVE-I)

Course Objectives

The Student will:

1. Understand the basics of high voltage engineering
2. Deal with the detailed analysis of Breakdown occurring in gaseous, liquids and solid dielectrics
3. Inform about generation and measurement of High voltage and current
4. Introduce High voltage testing methods
5. Understand the phenomenon of over-voltages, concept of insulation co-ordination.

UNIT – I: Introduction to High Voltage Technology and Applications

Electric Field Stresses, Gas / Vacuum as Insulator, Liquid Dielectrics, Solids and Composites, Estimation and Control of Electric Stress, Numerical methods for electric field computation, Surge voltages, their distribution and control, Applications of insulating materials in transformers, rotating machines, circuit breakers, cable power capacitors and bushings.

UNIT - II: Break Down in Gaseous and Liquid Dielectrics

Gases as insulating media, collision process, Ionization process, Townsend‘s criteria of breakdown in gases, Paschen‘s law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids.

Break Down in Solid Dielectrics

Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

UNIT - III: Generation of High Voltages and Currents

Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators.

Measurement of High Voltages and Currents

Measurement of High Direct Current voltages, Measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse, Oscilloscope for impulse voltage and current measurements.

UNIT - IV: Non-Destructive Testing of Material and Electrical Apparatus

Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements.

High Voltage Testing of Electrical Apparatus

Testing of Insulators and bushings, Testing of Isolators and circuit breakers, Testing of cables, Testing of Transformers, Testing of Surge Arresters, and Radio Interference measurements.

UNIT - V: Over Voltage Phenomenon and Insulation Co-ordination

Natural causes for over voltages – Lightning phenomenon, Overvoltage due to switching surges, system faults and other abnormal conditions, Principles of Insulation Coordination on High voltage and Extra High Voltage power systems.

TEXTBOOKS:

1. M. S. Naidu and V. Kamaraju, High Voltage Engineering by– TMH Publications, 4th Edition 2009.
2. E. Kuffel, W. S. Zaengl, J. Kuffel, High Voltage Engineering: Fundamentals by Elsevier, 2nd Edition 2000.

REFERENCE BOOKS:

1. C. L. Wadhwa, High Voltage Engineering by, New Age Internationals (P) Limited, 1997.
2. Ravindra Arora, Wolfgang Mosch, High Voltage Insulation Engineering by, New Age International (P) Limited, 1995.
3. "Mazen Abdel Salam, Hussein Anis, Ahdan El-Morshedy and Roshdy Radwan", High Voltage Engineering, Theory and Practice, CRC Press, 2nd Edition 2000.

Course Outcomes:

The Student will be able to:

1. Acquire knowledge on basics of high voltage engineering
2. Understand break-down phenomenon in different types of dielectrics
3. Understand generation and measurement of high voltages and currents
4. Know testing of various materials and electrical apparatus used in high voltage engineering
5. Understand the phenomenon of over-voltages, concept of insulation co-ordination

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

(F322D) SIGNALS AND SYSTEMS
(PROFESSIONAL ELECTIVE-I)

Course Objectives:

The Student will:

1. Understand various continuous time signals and systems.
2. Emphasize on the concept and methods those are necessary for analysis of continuous time signals and systems.
3. Gain more familiarity with different types of transformation and their properties which include Fourier Transform, Laplace Transform and Z-Transform.
4. Get Additional insight of sampling technique into various applications of signals and systems in different fields.
5. Understand the concept of Z-Transform and frequency response of discrete time signal

UNIT I: Signal Analysis

Energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity, additivity, homogeneity, shift-invariance, Causality, stability, reliability Linear shift-invariant (LSI) systems, Characterization of causality and stability of linear shift-invariant systems. Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function. Fourier Analysis: Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum

UNIT II: Fourier Transform

Deriving Fourier Transform from Fourier Series, Fourier Transform of arbitrary signal, standard signals, Periodic Signals, , Fourier Transforms involving Impulse function and Signum function, Properties of Fourier Transform, Introduction to Hilbert Transform Signal Transmission through Linear Systems Transfer function of a LTI system, Filter characteristics of Linear Systems, Distortion less transmission through a system, Signal bandwidth, System bandwidth, Causality and PaleyWiener criterion for physical realization,

UNIT III: Convolution and Correlation of Signals

Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution, Convolution property of Fourier Transforms, Cross Correlation and Auto Correlation of functions, Properties of Correlation function, Energy density spectrum, Parseval's Theorem, Power density spectrum Relation between Auto Correlation function and Energy/Power spectral density function, Relation between Convolution and Correlation, Detection of periodic signals in the presence of Noise by Correlation, Extraction of signal from noise by filtering.

UNIT IV: Sampling and Laplace Transforms

Sampling theorem – Graphical and analytical proof for Band Limited Signals, Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass sampling. Review of Laplace Transforms (L.T), Concept of Region of Convergence (ROC), Constraints on ROC for various classes of signals, Inverse Laplace Transform, Partial fraction expansion method for inverse Laplace Transform. Properties of L.T, Relation between Laplace Transform and Fourier Transform.

UNIT V: Z Transforms

Discrete time signal representation using Complex exponential and Sinusoidal components, Periodicity of Discrete time signal using complex exponential signal, Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Ztransforms.

TEXTBOOKS:

1. B.P. Lathi, “Signals, Systems & Communications”, 2009, BSP
2. A. Rama Krishna Rao,“Signals and Systems”,2008, TMH.

REFERENCES BOOKS:

1. Michel J. Robert, “Fundamentals of Signals and Systems” 2008, MGH International 43 Edition.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, “Signals and Systems” -, 2 ed., PHI
3. Simon Haykin and Van Veen, “Signals & Systems” -, 2 ed.Wiley

Course Outcomes:

The Student will be able to:

1. Analyze the properties of Continues and Discrete signals and systems with their frequency response.
2. Develop input output relationship for linear shift invariant system and frequency response of both continuous-time and discrete-time systems using Fourier Transforms.
3. Apply operations such as convolution, correlation for continuous and discrete time system
4 Understand the concept of sampling technique in different communication systems, and the limitations of Fourier transform and need for Laplace transform to analyze the system in s- domain.
5 Understand the process of sampling and the effects of under sampling.

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

(F322E) POWER SEMICONDUCTOR DRIVES
(PROFESSIONAL ELECTIVE-II)

Pre Requisite: Power Electronics

Course Objectives:

The Student will:

1. Get ability to use the (1phase & 3phase) Controlled Converters for Speed Control operation of DC Drives.
2. Understand Multi Quadrant operation of DC Drives by Dual converter, Different Braking Methods& Improvement of Speed response by Closed loop control.
3. Use the Choppers for Speed Control operation of DC Drives & An understanding of Four Quadrant operation of Dc drive by chopper.
4. Use the AC voltage controllers to control the speed of an Induction motor.
5. Understand Variable frequency control of Induction Motor by VSI, CSI, Cyclo converters & PWM Control.

UNIT – I: Control of DC Motors by Single Phase Converters

Introduction to Thyristor controlled Drives, Single Phase semi and Fully controlled converters connected to DC separately excited and DC series motors – continuous current operation – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque Characteristics- Problems on Converter fed DC motors.

UNIT – II: Control of DC Motors by Three Phase Converters

Three phase semi and fully controlled converters connected to DCseparately excited and DC series motors – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque characteristics – Problems.

UNIT – III: Four Quadrant Operation of DC Drives

Introduction to Four quadrant operation – Motoring operations, Electric Braking – Plugging, Dynamic and Regenerative Braking operations. Four quadrant operation of D.C motors by single phase and three phase dual converters.

Control of DC Motors by Choppers

Single quadrant, Two quadrant and four quadrant chopper fed dc separately excited and series motors – Continuous current operation – Output voltage and current wave forms – Speed and torque expressions – speed-torque characteristics – Problems on Chopper fed D.C Motors – Closed Loop operation (Block Diagram Only).

UNIT – IV: Control of Induction Motor through Stator Voltage and Stator Frequency: Variable voltage characteristics-Control of Induction Motor by Ac Voltage Controllers – Waveforms – speed torque characteristics.
Variable frequency characteristics-Variable frequency control of induction motor by Voltage source and current source inverter and cyclo converters- PWM control – Comparison of VSI and CSI operations – Speed torque characteristics – numerical problems on induction motor drives – Closed loop operation of induction motor drives (Block Diagram Only).

Rotor Side Control of Induction Motor: Static rotor resistance control – Slip power recovery – Static Scherbius drive – Static Kramer Drive – their performance and speed torque characteristics – advantages, applications, problems.

UNIT – V: Control of Synchronous Motors

Separate control and self-control of synchronous motors – Operation of self-controlled synchronous motors by VSI, CSI and Cycloconverters. Load commutated CSI fed Synchronous Motor – Operation – Waveforms – speed torque characteristics – Applications – Advantages and Numerical Problems – Closed Loop control operation of synchronous motor drives (Block Diagram Only), variable frequency control – Cyclo-converter, PWM based VSI & CSI.

TEXTBOOKS

1. B.K.Bose, “Modern Power Electronics and AC Drives” PHI.
2. S K Pillai “A First course on Electrical Drives” –New Age International (P) Ltd. 2nd Edition.
3. G K Dubey, "Fundamentals of Electric Drives”-Narosa Publications.
4. M.H.Rashid, “Power Electronic Circuits, Devices and applications” PHI.

REFERENCE BOOKS

1. P.C.Sen, “Thyristor DC Drives”-Wiley-Blackwell, 1981.
2. R.Krishnan “Electric motor drives - modeling, Analysis and control”, Prentice Hall PTR, 2001.

Course Outcomes:

The Student will be able to:

1. Able to design controlled converter for speed control operation of DC drives
2. Develop the circuits for chopper control drive for speed control of DC Motor
3. Analyze the multi quadrant operation of dual converter with breaking plugging operation
4. Design the AC voltage controllers to control the speed of an Induction motor
5. Develop the Variable frequency controllers of Induction Motor by VSI, CSI, Cyclo converters & PWM Control

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

(F322F) SWITCH MODE POWER SUPPLIES
(PROFESSIONAL ELECTIVE–II)

Prerequisite: Power Electronics

Course Objectives:
The Student will:

1. Introduce the concept of switched mode power supply with both D.C. and A.C. outputs.
2. Elaborately study the working of switched mode topologies including resonant power suppliers.
3. Analyze the behaviour of different converter.
4. Gain knowledge of their importance and applications in various fields.
5. Gain knowledge of Switched Mode Power Supply components

UNIT -I: Switched Mode Power Conversion:
Introduction to Switched Mode Power Supply**,** Linear DC to DC Power converters, Non-Idealities in reactive elements, Design of Inductors, Design of Transformers- Copper loss, Power factor, Non-isolated topologies, Isolated topologies, Quasi-resonant zero-current/zero-voltage switch Operating principle of Non- Isolated DC to DC power Converters (Buck, Boost, Buck-Boost, and Cuk) Equivalent circuit model of the non-isolated DC-DC converters. Isolated converters (forward, Flyback).

UNIT – II: Multiple Output Flyback Switch Mode Power Supplies:
Introduction, operating Modes, operating principles, Direct off line Flyback Switch Mode Power Supplies, Flyback converter, Snubber network, Problems

UNIT – III: Power Semiconductors in Switched Mode Topologies:
Introduction to Switched Mode Power Supply Topologies, The Power Supply Designer's Guide to High Voltage Transistors, Base Circuit Design for High Voltage Bipolar Transistors in Power Converters, Isolated Power Semiconductors for High Frequency Power Supply Applications.

UNIT – IV: Rectification:
Explanation, Advantages and disadvantages, SMPS and linear power supply comparison, Theory of operation, Input rectifier stage, Inverter stage, Voltage converter and output rectifier, Regulation, An Introduction to Synchronous Rectifier Circuits using Power MOS Transistors.

UNIT – V: Switch Mode Variable Power Supplies:
Introduction, variable SMPS techniques, operating**,** principles, practical limiting factors, Efficiency and EMI Applications.
Resonant Power Supplies: An Introduction to Resonant Power Supplies, Resonant Power Supply Converters - The Solution for Mains Pollution Problems.

TEXTBOOKS:

1. Keith H. Billings and Taylor Morey, “Switch Mode Power Supplies”, Tata McGraw-Hill Publishing Company, 3rd edition 2010.
2. Robert W. Erickson, “Switch Mode Power Supplies”, Springer, 2nd edition 2001.

REFERENCES:

1. Sanjaya Maniktala, “Switching Power Supplies A-Z”, Elsevier, 2ndEdition 2012
2. Steven M. Sandler, “Switch Mode Power Supplies “, Tata McGraw Hill, 1st Edition

Course Outcomes:

The Student will be able to:

1. Understand the concepts and principle of operation of various types of switched mode power supply systems for both D.C. and A.C. outputs.
2. Express the design and control of rectifiers, inverters.
3. Ability to design Flyback converters and analyze their characteristics
4. Design different controllers for converter.
5. Design various components of dc-dc converter.

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

(F322G) ANALYSIS OF POWER CONVERTERS
(PROFESSIONAL ELECTIVE-II)

Course Objectives

The Student will:

1. Comprehend the concepts of converters
2. Relate to the applications of phase-controlled rectifiers
3. Describe the importance of AC voltage controllers and cyclo converters for various industrial applications
4. Analyze and design switch mode power electronic converters for various applications including microprocessor power supplies, renewable energy systems, and motor drives.
5. Analyze pulse width modulated inverters which are used in variable speed drives

Unit I: Single Phase AC Voltage Controllers:

Single phase AC voltage controllers with Resistive, Resistive-inductive and Resistive-inductive-induced e.m.f. loads - ac voltage controllers with PW Control - Effects of source and load inductances - Synchronous tap changers-Applications - numerical problems

Unit II: Three Phase AC Voltage Controllers

Three phase AC voltage controllers - Analysis of controllers with star and delta Connected Resistive, Resistive-inductive loads - Effects of source and load Inductances - applications - numerical problems. Cycloconverters: Single phase to single phase cycloconverters - analysis of midpoint and bridge Configurations - Three phase to three phase cycloconverters - analysis of Midpoint and bridge configurations - Limitations - Advantages - Applications- numerical problems

Unit III: Single Phase Converters

Single phase converters - Half controlled and Fully controlled converters -Evaluation of input power factor and harmonic factor - continuous and Discontinuous load current - single phase dual converters - power factor Improvements - Extinction angle control - symmetrical angle control - PWM -single phase sinusoidal PWM - single phase series converters - Applications -Numerical problems. Three Phase Converters: Three phase converters - Half controlled and fully controlled converters - Evaluation of input power factor and harmonic factor - continuous and Discontinuous load current - three phase dual converters - power factor Improvements - three phase PWM - twelve pulse converters - applications -Numerical problems.

Unit IV: D.C. to D.C. Converters

Analysis of step-down and step-up dc to dc converters with resistive and Resistive-inductive loads - Switched mode regulators - Analysis of Buck Regulators - Boost regulators - buck and boost regulators - Cuk regulators - Condition for continuous inductor current and capacitor voltage - comparison of regulators –Multi output boost converters - advantages - applications - Numerical problems.

Unit V: Pulse Width Modulated Inverters (single phase)

Principle of operation - performance parameters - single phase bridge inverter -evaluation of output voltage and current with resistive, inductive and Capacitive loads - Voltage control of single phase inverters - single PWM - Multiple PWM - sinusoidal PWM - modified PWM - phase displacement Control - Advanced modulation techniques for improved performance - Trapezoidal, staircase, stepped, harmonic injection and delta modulation - Advantage - application - numerical problems. Pulse Width Modulated Inverters(three phase): Three phase inverters - analysis of 180 degree condition for output voltage And current with resistive, inductive loads - analysis of 120 degree Conduction - voltage control of three phase inverters - sinusoidal PWM - Third Harmonic PWM – 60 degree PWM - space vector modulation - Comparison of PWM techniques - harmonic reductions - Current Source Inverter - variable d.c. link inverter - boost inverter - buck and boost inverter - inverter circuit design - advantages -applications - numerical problems

TEXTBOOKS:

1. Mohammed H. Rashid, “Power Electronics”, Pearson Education -Third Edition - First Indian reprint 2004.
2. Ned Mohan, Tore M. Undeland and William P. Robbins, Power Electronics, John Wiley and Sons - Second Edition

REFERENCES:

1. Daniel W. Hart, “Power Electronics”
2. R.W. Erickson, “Fundamentals of Power Electronis”, 2nd Edition.
3. Timothy, L. Skvarenina, Purdue University, “The power electronics Handbook”

Course Outcomes

The Student will be able to:

1. understand the basic principles of switch mode power conversion
2. understand the operating principles and models of different types of power electronic converters including dc-dc converters, PWM rectifiers and inverters
3. choose appropriate power converter topologies and design the power stage and feedback controllers for various applications
4. use power electronic simulation packages for analyzing and designing power converters.
5. analyze various single phase and three phase power converter circuits and understand their applications.

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UGC AUTONOMOUS

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

(F3221) ELECTRICAL SIMULATION LAB-II

Pre-requisite: Power Systems

Course Objectives

The Student will:

1. Develop programs for power system analysis.
2. Design models for power systems and power electronics.
3. Analyse the Load flow Solution using Gauss Seidel Method.
4. Obtain the original unbalanced phase voltages from Symmetrical Components.
5. Analyse the transient response of an RLC Circuit.

List of Experiments:

Any Ten Experiments from list of experiments

Experiment 1: Determination of line performance when loaded at receiving end.
Experiment 2: Formation of bus Admittance matrix.
Experiment 3: Load flow Solution using Gauss Seidel Method.
Experiment 4: Load flow solution using Newton Raphson method in Rectangular Coordinates.
Experiment 5: Unsymmetrical Fault Analysis.
Experiment 6: Z-bus Building Algorithm.
Experiment 7: Obtain Symmetrical components of a set of Unbalanced currents.
Experiment 8: Obtain the original Unbalanced phase voltages from Symmetrical Components.
Experiment 9: Short Circuit Analysis of 14 bus system.
Experiment 10: Load Frequency control of a single area system.
Experiment 11: Load frequency control of a two-area system.
Experiment 12: Transient Response of an RLC Circuit.

Course Outcomes

The Student will be able to:

1. Understand/simulate/analyze power system analysis using software.
2. Models of power systems and power electronics.
3. Analyse the Load flow Solution using Gauss Seidel Method.
4. Obtain the original unbalanced phase voltages from Symmetrical Components.
5. Analyse the transient response of an RLC Circuit.

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

(F3222) POWER SYSTEMS LAB

Prerequisites: Power System

Course Objectives:
The Student will:

1. Gain knowledge on line – line and line to ground faults (L-G, L-L, L-L-G,L-L-L-G) and its analysis on synchronous machine.
2. Evaluate the behaviour of generator protection system.
3. Analyse the various faults in electrical machines.
4. Analyse power angle characteristics of salient pole alternator
5. Perform short circuit analysis on synchronous machine

List of Experiments:

All Ten Experiments from list of experiments

Experiment 1: Determination of sequence impedance of cylindrical rotor synchronous machine.
Experiment 2: Single line to ground fault (L-G) analysis of cylindrical rotor synchronous machine.
Experiment 3: Line to line fault (L-L) analysis of cylindrical rotor synchronous machine.
Experiment 4: Double line to ground fault (L-L-G) analysis of cylindrical rotor synchronous machine.
Experiment 5: Triple line to ground fault (L-L-L-G) analysis of cylindrical rotor synchronous machine.
Experiment 6: Determination of sub-transient reactance of a salient pole synchronous machine.
Experiment 7: Power angle characteristics of salient pole alternator.
Experiment 8: Determine ABCD parameters of transmission lines.
Experiment 9: Determine sequence impedance of three phase transformer.
Experiment 10: Determine the equivalent winding of three phase transformer

Course Outcomes:
The Student will be able to:

1. Understand and acquire knowledge on short circuit analysis.
2. Understand the characteristics of synchronous machine.
3. Determine the ABCD parameters of transmission line.
4. Analyse the various faults in electrical machines.
5. Determine sequence impedance of three phase transformer.

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

(F3223) MICROPROCESSORS AND MICROCONTROLLERS LAB

Course Objectives

The Student will:

1. Understand the basic 16-bit microprocessor architecture and its functionalities.
2. Develop the microprocessor-based programs for various applications.
3. Make the interfacing in between microprocessor and various peripherals.
4. Develop the microcontroller-based programs for various applications.
5. Understand basic feature of 8051 controller.

List of Experiments:

Any Ten Experiments from list of experiments

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

Experiment 1. Programs for 16 bit arithmetic operations for 8086 (using Various Addressing Modes).

Experiment 2. Program for sorting an array for 8086.

Experiment 3. Program for searching for a number or character in a string for 8086.

Experiment 4. Program for string manipulations for 8086.

Experiment 5. Program for digital clock design using 8086.

Experiment 6. Interfacing ADC and DAC to 8086.

Experiment 7. Parallel communication between two microprocessors using 8255.

Experiment 8. Serial communication between two microprocessor kits using 8251.

Experiment 9. Interfacing to 8086 and programming to control stepper motor.

Experiment 10. Programming using arithmetic, logical and bit manipulation instructions of 8051.

Experiment 11. Program and verify Timer/ Counter in 8051.

Experiment 12. Program and verify Interrupt handling in 8051

Experiment 13. UART Operation in 8051.

Experiment 14. Communication between 8051 kit and PC.

Experiment 15. Interfacing LCD to 8051.

Experiment 16. Interfacing Matrix/ Keyboard to 8051.

Experiment 17. Data Transfer from Peripheral to Memory through DMA controller 8237 / 8257.

Course Outcomes

The Student will be able to:

1. Analyse 8086 microprocessors architectures and its functionalities.
2. Design 8086 Microprocessor based systems for real time applications using programming languages like Assembly Language and MASM.
3. Interface and program external peripherals and I/O devices to 8086 microprocessor.
4. Explain the basics of 8051 microcontroller's architecture and its functionalities.
5. Design microcontroller based projects for real time applications.

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UGC AUTONOMOUS

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

(F320C) PROFESSIONAL ETHICS

Course Objectives:

The Student will:

1. Create social awareness & inculcate ethical values among the students.
2. Enable them to understand theoretical aspects of the subject
3. Imbibe and internalize the values that are so important for ethical behaviour in society including workplace.
4. Realize the significance of ethics in professional environment,
5. Gain the knowledge of academic learning with experimental learning in a profession.

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.

TEXTBOOKS:

1. R. Subramanian, "Professional ethics" Oxford press.
2. R.S.Nagarajan, "Text book on Professional ethics and human values"New age international.

REFERENCE BOOKS:

1. D.R.Kiran, “Professional ethics and human value” Tata McGraw Hills education.
2. W. Martin and Roland Schinzinger, “Ethics in engineering by Mike Tata McGraw Hills education.
3. Edmund G Seebauer and Robert L.Barry, “Fundamental of Ethics” Oxford university press.

Course Outcomes:

The Student will be able to:

1. Understand ethics and morals are imbibed in a student since childhood, still there is a need to inculcate certain ethical values among them
2. Understand the difference between the terms professionals as professionalism
3. Learn not only the theoretical aspect of the subject but also to internalize the values that are so important for ethical behavior in society including work places.
4. Apply the different types of professional ethical codes in their organization.
5. Make use of the rules framed by the auditors.

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UGC AUTONOMOUS

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

(F412A) SWITCH GEAR PROTECTION
(PROFESSIONAL ELECTIVE -III)

Course Objectives:
The Student will:

1. Understand power system protection and switchgear.
2. Understand applications of the main components used in power system protection for electric machines, transformers, bus bars, overhead and underground feeders.
3. Analyze applications of main types Circuit breakers, Relays for protection of generators, transformers and protection of feeders from over- voltages and other hazards. It emphasis on neutral grounding for overall protection
4. Develop an ability and skill to design the feasible protection systems needed for each main part of a power system
5. Understand about types of relays and its applications.

UNIT-I : Circuit Breakers-1
Circuit Breakers: Elementary principles of arc interruption, Restricking Voltage and Recovery voltages: Restriking Phenomenon, Average and Max. RRRV, Numerical Problems - Current Chopping and Resistance Switching - CB ratings and Specifications: Types and Numerical Problems. – Auto reclosures.

Circuit Breakers-2
Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers.

UNIT-II: Electromagnetic and Static Relays
Principle of Operation and Construction of Attracted armature, Balanced Beam, Moving Coil, induction Disc and Induction Cup relays. Relays Classification: Instantaneous, DMT and IDMT types.

Application of relays:
Over current/ Under voltage relays, Direction relays, Differential Relays and Percentage Differential Relays. Universal torque equation, Distance relays: Impedance, Reactance and Mho and Off-Set Mho relays, Characteristics of Distance Relays and Comparison. Static Relays: Static Relays verses Electromagnetic Relays.

UNIT-III: Generator Protection
Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected.

Transformer Protection:
Protection of transformers: Percentage Differential Protection, Numerical Problem on Design of CT s Ratio, Buchholz relay Protection.

UNIT-IV: Feeder and Bus-Bar Protection

Protection of Lines: Over Current, Carrier Current and Three-zone distance relay protection using Impedance relays. Translay Relay. Protection of Bus bars – Differential protection.

Neutral Grounding:

Grounded and Ungrounded Neutral Systems: Effects of Ungrounded Neutral on system performance. Methods of Neutral Grounding: Solid, Resistance, Reactance - Arcing Grounds and Grounding Practices

UNIT-V: Protection against over voltages

Generation of Over Voltages in Power Systems.-Protection against Lightning Over Voltages - Valve type and Zinc-Oxide Lighting Arresters - Insulation Coordination -BIL, Impulse Ratio, Standard Impulse Test Wave, Volt-Time Characteristics.

TEXTBOOKS:

1. Sunil S Rao, "Switchgear and Protection" Khanna Publishers.
2. Badari Ram, D.N Viswakarma, "Power System Protection and Switchgear" TMH Publications.

REFERENCES:

1. Y.G. Paithankar, "Transmission network Protection" Taylor and Francis, 2009.
2. Bhuvanesh Oza, "Power system protection and switch gear" TMH, 2010.
3. C.L.Wadhwa, "Electrical Power Systems" New Age international (P) Limited, Publishers, 3nd edition.

Course outcomes:

The student will be able to:

1. Student gains knowledge on different Protective Equipments or Power Systems
2. Know about various protective systems- how it works and where it works
3. Different applications of the relays, circuit breakers, grounding for different elements of power system are also discussed in the subject.
4. Ability to discuss recovery and Restriking.
5. Ability to express Oil circuit Breaker, Air Blast circuit Breakers, SF6 Circuit Breaker.

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UGC AUTONOMOUS

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

(F412B) FLEXIBLE AC TRANSMISSION SYSTEMS
(PROFESSIONAL ELECTIVE -III)

Course Objectives:

The student will:

1. Introduce various Power Electronics controllers used in the Power Systems for the fast real and reactive power control.
2. Understand the fundamentals of FACTS Controllers, Importance of controllable parameters and types of FACTS controllers & their benefits
3. Recall the objectives of Shunt and Series compensation
4. Explain control of STATCOM and SVC and their comparison And the regulation of STATCOM
5. Analyze the functioning and control of GCSC, TSSC and TCSC.

UNIT-I: Facts Concepts

Transmission interconnections power flow in an AC system, loading capability limits, Dynamic Stability considerations, importance of controllable parameters basic types of FACTS controllers,Benefits from FACTS controllers.

UNIT-II: Voltage Source Converters

Single phase three phase full wave bridge converters transformer connections for 12 pulse 24 and 48 pulse operation. Three level voltage source converter, pulse width modulation converter, basic concept of current source Converters, and comparison of current source converters with voltage source converters.

UNIT-III: Static Shunt Compensation

Objectives of shunt compensation, mid-point voltage regulation voltage instability prevention, improvement of transient stability, Power oscillation damping, Methods of controllable VAR generation, variable impedance type static VAR generators, switching converter type VAR generators hybrid VAR generators.

UNIT-IV: SVC and STATCOM

The regulation and slope transfer function and dynamic performance, transient stability enhancement and power oscillation damping, operating point control and summary of compensator control.

UNIT-V: Static Series Compensators

Concept of series capacitive compensation, improvement of transient stability, power oscillation
damping, and functional requirements of GTO thyristor-controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor-controlled series capacitor (TCSC), Control schemes for GSC, TSSC and TCSC.

TEXTBOOKS:

1. NarainG.Hingorani, Laszio. Gyugyl, “Understanding FACTS Concepts and Technology of Flexible AC Transmission System”, Standard Publishers, Delhi, First Edition, 2001.
2. Mohan Mathur, R., Rajiv. K. Varma, “Thyristor – Based Facts Controllers forElectrical Transmission Systems”, IEEE press and John Wiley & Sons, First Edition, 2002

REFERENCES:

1. A.T.John, “Flexible AC Transmission System”, Institution of Electrical and Electronic Engineers (IEEE), First Edition, 1999.
2. V.K.Sood, “HVDC and FACTS controllers- Applications of Static Converters in Power System”, Kluwer Academic Publishers, First Edition, 2004.
3. K.R.Padiyar, “FACTS Controllers in Power Transmission and Distribution”, New Age International Publishers, New Delhi, Reprint, 2008.

Course outcomes:

The student will be able to:

1. An ability to apply knowledge of FACTS Controllers.
2. An ability to identify, formulate, and solve real network problems with FACTS controllers
3. Understand various systems thoroughly and their requirements
4. Interpret the control circuits of Shunt Controllers SVC & STATCOM for various functions viz. Transient stability Enhancement, voltage instability prevention and power oscillation damping
5. Detect the Power and control circuits of Series Controllers GCSC, TSSC and TCSC.

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

(F412C) POWER QUALITY
(PROFESSIONAL ELECTIVE -III)

Course Objectives:
The Student will:

1. Know different terms of power quality.
2. Illustrate of voltage power quality issue - short and long interruption.
3. Construct study of characterization of voltage sag magnitude and three phase unbalanced voltage sag.
4. Know the behaviour of power electronics loads; induction motors, synchronous motor etc by the power quality issues.
5. Prepare mitigation of power quality issues by the VSI converters.

UNIT-I: Introduction
Introduction of the Power Quality (PQ) problem, Terms used in PQ: Voltage, Sag, Swell, Surges, Harmonics, over voltages, spikes, Voltage fluctuations, Transients, Interruption, overview of power quality phenomenon, Remedies to improve power quality, power quality monitoring.

UNIT-II: Long &Short Interruptions
Long interruptions – Definition – Difference between failures, outage, Interruptions – causes of Long interruptions – Origin of interruptions – Limits for the Interruption frequency – Limits for the interruption duration – Costs of Interruption – Overview of reliability evaluation to power quality, Comparison of observations and reliability evaluation.

Short interruptions
Definition, Origin of short interruptions, Basic principle, Fuse saving, Voltage magnitude events due to re-closing, Voltage during the interruption, Monitoring of short interruptions, Difference between medium and low voltage systems. Multiple events, Single phase tripping – Voltage and current during fault period, Voltage and current at post fault period, Stochastic prediction of short interruptions

UNIT-III: 1 & 3-Phase Voltage Sag Characterization
Voltage sag – Definition, Causes of voltage sag, Voltage sag magnitude, and monitoring, Theoretical calculation of voltage sag magnitude, Voltage sag calculation in non-radial systems, Meshed systems, and voltage sag duration. Three phase faults, Phase angle jumps, Magnitude and phase angle jumps for three phase unbalanced sags, Load influence on voltage sags.

UNIT-IV: Power Quality Considerations in Industrial Power Systems

Voltage sag – Equipment behavior of power electronic loads, Induction motors, Synchronous motors, computers, Consumer electronics, Adjustable speed AC drives and its operation. Mitigation of AC Drives, Adjustable speed DC drives and its operation, Mitigation methods of DC drives.

UNIT-V: Mitigation of Interruptions & Voltage Sags

Overview of mitigation methods from fault to trip, reducing the number of faults, reducing the fault clearing time changing the power system, installing mitigation equipment, Improving equipment immunity, Different events and mitigation methods. System equipment interface –Voltage source converter, Series voltage controller, Shunt controller, combined shunt and series controller.

PQ and EMC standards:

Introduction to standardization, IEC electromagnetic compatibility standards, European voltage characteristics standards, PQ surveys.

TEXTBOOKS:

1. Math H J Bollen, "Understanding Power Quality Problems" Wiley Publications, Volume 5, 2000.
2. C. Sankaran,"Power Quality", CRC Presss,First Edition, 2002.
3. Alexander Kusko, Marc Thompson, "Power Quality in Electrical Systems", Tata McGraw Hill Publishing Co. Ltd., New Delhi, First Edition, 2007.
4. Surajit Chattopadhyay, Madhu chhanda Mitra, Samarjit Sengupta, "Electric Power Quality", Springer, First Edition, 2007

REFERENCES:

1. R. SastryVedamMulukutlaS.Sarma, "Power Quality VAR Compensation in Power Systems", CRC Press, First Edition, 2008.
2. Roger C. Dugan, Mark F. Mc Granaghan, SuryaSantoso, H. Wayne Beaty, "Electrical Power Systems Quality", Tata McGraw Hill Education Private Ltd, New Delhi, Second Edition, 2003.

Course outcomes:

The student will be able to:

1. Know the severity of power quality problems in distribution system.
2. Understand the concept of voltage sag transformation from up-stream (higher voltages) to down-stream (lower voltage).
3. Compute the concept of improving the power quality to sensitive load by various mitigating custom power devices.
4. Analyze voltage sag problems and suggest preventive techniques
5. Identify the harmonic sources and the effects of harmonic distortion

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UGC AUTONOMOUS

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

(F412D) POWER SYSTEM OPERATION AND CONTROL
(PROFESSIONAL ELECTIVE -IV)

Course Objectives:
The Student will:

1. Understand the Load-Frequency control
2. Analyze different methods to control reactive power and voltage
3. Solve economic dispatch problem
4. Solve unit commitment problem
5. Understand the need of real time control of power systems

UNIT-I: Load –Frequency Control
Basics of speed governing mechanism and modeling – speed load characteristics – load sharing between two synchronous machines in parallel. Control area concept LFC control of a single-area system. Static and dynamic analysis of uncontrolled and controlled cases.
Integration of economic dispatch control with LFC. Two area system – modeling - static analysis of uncontrolled case - tie line with frequency bias control of two-area system - state variable model.

UNIT-II: Reactive Power – Voltage Control
Basics of reactive power control - Excitation systems – modeling. Static and dynamic analysis - stability compensation - generation and absorption of reactive power. Relation between voltage, power and reactive power at a node.
Method of voltage control - tap-changing transformer. System level control using generator voltage magnitude setting, tap setting of OLTC transformer and MVAR injection of switched capacitors to maintain acceptable voltage profile and to minimize transmission loss.

UNIT-III: Economic Load Dispatch
Statement of economic dispatch problem – cost of generation – incremental cost curve.
Co-ordination equations without loss and with loss, solution by direct method and λ-iteration method.

UNIT-IV: Unit Commitment
Statement of Unit Commitment problem – constraints; spinning reserve, thermal unit constraints, hydro constraints, fuel constraints and other constraints.
Solution methods - Priority-list methods - forward dynamic programming approach. Numerical problems on priority-list method using full-load average production cost and Forward DP method.

UNIT-V: Computer Control of Power Systems
Need of computer control of power systems. Concept of energy control centre (or) load dispatch centre and the functions - system monitoring - data acquisition and control.
System hardware configuration – SCADA and EMS functions. Network topology – Importance of Load Forecasting and simple techniques of forecasting.

TEXTBOOKS:

1. D. P. Kothari and I. J. Nagrath, 'Modern Power System Analysis', Third Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
2. Olle. I. Elgerd, 'Electric Energy Systems Theory – An Introduction', Tata McGraw Hill Publishing Company Ltd, New Delhi, 30th reprint, 2007.

REFERENCES:

1. Chakrabarti & Haldar, "Power System Analysis: Operation and Control", Prentice Hall of India, 2004 Edition.
2. P. Kundur, Neal J. Balu, 'Power System Stability & Control', IEEE, 1998.
3. C. L. Wadhwa, 'Power System Analysis', New Age International-6th Edition, 2010, ISBN : 978-81-224-2839-1
4. Robert Miller, James Malinowski, 'Power System Operation', Tata McGraw Hill Publishing Company Ltd, New Delhi, 3rd Edition 2009.

Course outcomes:

The student will be able to:

1. Analyze Load Frequency Control of single-area and two-area systems
2. Analyze different methods to control reactive power and voltage
3. Solve economic dispatch problem by direct method and λ-iteration method
4. Solve Unit Commitment by Priority-list methods - forward dynamic programming approach
5. Summary the need and operation of real time control of power systems.

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UGC AUTONOMOUS

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

(F412E) SPECIAL MACHINES
(PROFESSIONAL ELECTIVE -IV)

Course Objectives:
The Student will:

1. Impart knowledge on principle of operation, control and performance of stepper motors
2. Understand the construction, principle of operation, control and performance of switched reluctance motors
3. Illustrate control and performance of Brushless DC motors
4. Evaluate the performance of linear induction motor.
5. Gain knowledge on principle of operation, control and performance of Reluctance motors

UNIT-I: Special Types of D.C Machines-I
Series booster-Shunt Booster-Non-reversible boost-Reversible booster
Special Types of DC Machines –II
Armature excited machines—Rosenberg generator- The Amplidyne and metadyne—Rototrol and Regulex-third brush generator-three-wire generator-dynamometer.

UNIT-II : Stepper Motors
Introduction-synchronous inductor (or hybrid stepper motor), Hybrid stepping motor, construction, principles of operation, Energisation with two phase at a time- essential conditions for the satisfactory operation of a 2-phase hybrid step motor- very slow- speed synchronous motor for servo control different configurations for switching the phase windings-control circuits for stepping motors-an open loop controller for a 2-phase stepping motor.

UNIT-III: Variable Reluctance Stepping Motors
Variable reluctance (VR) Stepper motors, single-stack VR step motors, Multiple stack VR motors Open-loop control of 3-phase VR step motor-closed-Loop control of step motor, discriminator (or rotor position sensor) transilator, major loop-characteristics of step motor in open-loop drive – comparison between open-loop position control with step motor and a position control servo using a conventional (dc or ac) servo motor-Suitability and areas of application of stepper motors-5- phase hybrid stepping motor-single phase-stepper motor, the construction, operating principle torque developed in the motor.
Switched Reluctance Motor
Introduction – improvements in the design of conventional reluctance motors- Some distinctive differences between SR and conventional reluctance motors-principle of operation of SRM- Some design aspects of stator and rotor pole arcs, design of stator and rotor and pole arcs in SR motor determination of $L(\theta)$--- θ profile –power converter for SR motor-A numerical example –Rotor sensing mechanism and logic control, drive and power circuits, position sensing of rotor with Hall problems— derivation of torque expression, general linear case.

UNIT-IV: Permanent Magnet Materials and Motors

Introduction, Hysteresis loops and recoil line- stator frames (pole and yoke - part) of conventional PM dc Motors, Equivalent circuit of a PM-Development of Electronically commutated dc motor from conventional dc motor.

Brushless DC Motor

Types of construction – principle of operation of BLDM- sensing and switching logic scheme, sensing logic controller, lockout pulses –drive and power circuits, modeling and magnet circuit d-q analysis of BLDM - transient analysis formulation in terms of flux linkages as state variables-Approximate solution for current and torque under steady state –Theory of BLDM as variable speed synchronous motor (assuming sinusoidal flux distribution)- Methods or reducing Torque Pulsations, 180 degrees pole arc and 120 degree current sheet.

UNIT-V: Linear Induction Motor

Development of a double-sided LIM from rotary type IM- A schematic of LIM drive for electric traction development of one sided LIM with back iron-field analysis of a DSLIM fundamental assumptions.

TEXTBOOKS:

1. K.Venkataratnam, Special electrical machines, university press.
2. R.K. Rajput - Electrical machines - 5th edition.

REFERENCES:

1. V.V. Athani - Stepper motor: Fundamentals, Applications and Design, New age International Publications.

Course outcomes:

The student will be able to

1. Acquires knowledge on constructional features of Rosenberg generator, amplidyne, metadyne, etc.,
2. Attains knowledge on stepper motors and variable reluctance motors
3. Evaluate the characteristics of magnetic materials and BLDC motors and linear induction motor.
4. Analyze the performance of various special machines
5. Application of special motors for necessary requirements.

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

(F412F) ELECTRICAL MACHINE DESIGN
(PROFESSIONAL ELECTIVE -IV)

Course Objectives:
The Student will:

1. Provide sound knowledge about constructional details and design of various electrical machines.
2. Study mmf calculation and thermal rating of various types of electrical machines.
3. Design armature and field systems for D.C. machines.
4. Design stator and rotor of induction machines.
5. Design stator and rotor of synchronous machines and study their thermal behavior.

UNIT-I: Introduction
Major considerations in Electrical Machine Design - Electrical Engineering Materials – Space factor – Choice of Specific Electrical and Magnetic loadings - Thermal considerations - Heat flow – Temperature rise - Rating of machines – Standard specifications.

UNIT-II: DC Machines
Output Equations – Main Dimensions - Magnetic circuit calculations – Carter's Coefficient – Net length of Iron –Real & Apparent flux densities – Selection of number of poles – Design of Armature – Design of commutator and brushes – performance prediction using design values.

UNIT-III: Transformers
Output Equations – Main Dimensions - KVA output for single and three phase transformers – Window space factor – Overall dimensions – Operating characteristics – Regulation – No load current – Temperature rise in Transformers – Design of Tank - Methods of cooling of Transformers.

UNIT-IV: Induction Motors
Output equation of Induction motor – Main dimensions – Length of air gap- Rules for selecting rotor slots of squirrel cage machines – Design of rotor bars & slots – Design of end rings – Design of wound rotor -Magnetic leakage calculations – Leakage reactance of poly phase machines- Magnetizing current - Short circuit current – Circle diagram - Operating characteristics.

UNIT-V: Synchronous Machines
Output equations – choice of loadings – Design of salient pole machines – Short circuit ratio – shape of pole face – Armature design – Armature parameters – Estimation of air gap length – Design of rotor –Design of damper winding – Determination of full load field mmf – Design of field winding – Design of turbo alternators – Rotor design.

TEXTBOOKS:

1. Sawhney, A.K., 'A Course in Electrical Machine Design', DhanpatRai& Sons, New Delhi, 1984.
2. Sen, S.K., 'Principles of Electrical Machine Designs with Computer Programmes', Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 1987.

REFERENCES:

1. A. Shanmuga sundaram, G.Gangadharan, R.Palani 'Electrical Machine Design Data Book', New Age Intenational Pvt. Ltd., Reprint 2007.

Course outcomes:

The student will be able to:

1. Distinguish the specific electrical and magnetic loadings.
2. Design of commutator and brushes.
3. Analyze the operating characteristics of Transformers
4. Design of Induction motors and evaluates the characteristics.
5. Design of rotor and field winding in the synchronous machines.

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UGC AUTONOMOUS

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

(F4101) LIFE SKILLS AND PROFESSIONAL SKILLS LAB

EXPERIMENT 1: Communication skills-debates, practical sessions & public speaking skills-LS-23
EXPERIMENT 2: Dealing with Criticism & Conflict Resolution & Management-LS-26
EXPERIMENT 3: Thinking Out-of-the Box – Case-study & Activity Based-LS-28
EXPERIMENT 4: Developing a Vision & Action-plan. -LS-30
EXPERIMENT 5: SWOT Analysis – Individual-LS-31
EXPERIMENT 6: 1 Yoga & Meditation – Demonstration, Practice & Techniques YS-8
EXPERIMENT 7: Corporate Etiquettes-LS-35
EXPERIMENT 8: JAM Sessions& Mock Interviews-ES 4.
EXPERIMENT 9: Interview Questions & Skills-ES 5
EXPERIMENT 10: Group Discussion-ES 3
EXPERIMENT 11: Aptitude- Verbal Ability Revision-ES-32
EXPERIMENT 12: Aptitude- Arithmetic Revision-ES-33
EXPERIMENT 13: Aptitude- Reasoning Revision-ES-34

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

(F422A) ELECTRICAL DISTRIBUTION SYSTEMS
(PROFESSIONAL ELECTIVE - V)

Course Objectives:

The student will:

1. Understand different types of power distributions systems and their usage in days life.
2. Familiar with protection and coordination of protective devices in distribution systems.
3. Familiar with short circuit analysis
4. Understand how power factor can be improved and need for its improvement.
5. Know the optimal location of substation.

UNIT-I: General Concepts

Introduction to distribution systems, Load modeling and characteristics. Load factor, Coincidence factor, Contribution factor and Loss factor - Relationship between the Load factor and loss factor. Classification of loads (Residential, Commercial, Agricultural and Industrial) and their characteristics

Distribution Feeders

Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, Factors affecting the feeder voltage level, Feeder loading, Application of general circuit constants to radial feeders, basic design practice of the secondary distribution system, secondary banking, secondary network types, secondary mains.

UNIT-II : Substations

Location of Substations: Rating of distribution substation, service area with n-primary feeders, Benefits derived through optimal location of substations, optimal location of substations.

Distribution System Analysis

Voltage drop and Power-loss calculations: Derivation for voltage drop and Power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines, Analysis of non-three phase systems.

UNIT-III: Protection

Objectives of distribution system protection, types of common faults and procedure for fault calculations. Protective Devices: Principle of operation of Fuses, Circuit Reclosures, Line Sectionalizes, and Circuit Breakers,

Coordination

Coordination of Protective Devices: Objectives of protection coordination, General coordination procedure.

UNIT-IV: Compensation for Power Factor Improvement

Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched), Power factor correction, capacitor allocation - Economic justification - Procedure to determine the best capacitor location

UNIT-V: Voltage Control

Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation, voltage fluctuations.

TEXTBOOKS:

1. Turan Gonen "Electric Power Distribution system Engineering,"TMH.
2. A.S. Pabla "Electric Power Distribution," Tata Mc Graw-hill Publishing Company, 1997, 6^{th} edition.

REFERENCES:

1. S.Sivanagaraju,V.Sankar,Dhanpat Rai andCo"Electrical Power Distribution and Automation"
2. V. Kamaraju, "Electrical Power Distribution Systems" ,TMH Publishers,2^{nd}Edition.

Course outcomes:

The student will be able to:

1. Understand different loads and their characteristics and design the distribution feeders.
2. Design substations and their optimal location
3. Apply various protective devices and its coordination techniques to distribution system.
4. Recognize the necessity of power factor correction and voltage drop compensation
5. Analyze the characteristics of Voltage regulating Equipment

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UGC AUTONOMOUS

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

(F422B) DIGITAL CONTROL SYSTEMS
(PROFESSIONAL ELECTIVE - V)

Course Objectives:

The student will

1. Equip the basic knowledge of discretization.
2. Study the stability analysis of digital control system.
3. Determine steady state performance of digital control systems.
4. Design the controller and observer for digital control systems.
5. Know the discrete PID controller.

UNIT-I: Sampling and Reconstruction

Introduction, Examples of Data control systems – Digital to Analog conversion and Analog to Digital conversion, sample and hold operations.

The Z – Transforms

Introduction, Linear difference equations, pulse response, Z – transforms, Theorems of Z – Transforms, the inverse Z – transforms, Modified Z- Transforms

Z-Plane Analysis of Discrete-Time Control System

Z-Transform method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane.

UNIT-II : State Space Analysis

State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations

Controllability and Observability

Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function.

UNIT-III: Stability Analysis

Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jurystability test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.

UNIT-IV: Design of Discrete Time Control System by Conventional Methods

Transient and steady – State response Analysis – Design based on the frequency response method –Bilinear Transformation and Design procedure in the w-plane, Lead, Lag and Lead-Lag compensators and digital PID controllers.

UNIT-V: State Feedback Controllers and Observers

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula. State Observers – Full order and Reduced order observers.

TEXTBOOKS:

1. Discrete-Time Control systems – K. Ogata, Pearson Education/PHI, 2nd Edition
2. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.

REFERENCES:

1. Digital Control and State Variable Methods by M.Gopal, TMH
2. Digital Control Systems- **Isermann,** Rolf, Volume 1: Fundamentals, Deterministic Control.

Course Outcomes:

The student will be able to

1. Understand mathematical models of linear discrete-time control systems using transfer functions and state-space models.
2. Analyse transient and steady state behaviours of linear discrete time control systems.
3. Determine whether performance of linear discrete time control systems meet specified design criteria.
4. Design controllers and observers for linear discrete-time control systems so that their performance meets specified design criteria.
5. Design the PID controllers in discrete time intervals.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

(F422C) EHV AC TRANSMISSION
(PROFESSIONAL ELECTIVE - V)

Course Objectives:

The student will

1. Identify the different aspects of Extra High Voltage A.C and D.C Transmission design and Analysis.
2. Understand the basic concepts of EHV AC transmission.
3. Calculate electrostatic fields of EHV AC lines and its effects.
4. Understand the importance of modern developments of E.H.V and U.H.V transmission systems.
5. Demonstrate EHV AC transmission system components, protection and insulation level for over voltages.

UNIT-I: E.H.V.A.C

Transmission line trends and preliminary aspect standard transmission voltages – Estimation at line and ground parameters-Bundle conductor systems-Inductance and Capacitance of E.H.V. lines – Positive, negative and zero sequence impedance – Line Parameters for modes of propagation.

UNIT-II: Electrostatic Field and Voltage Gradients

Calculations of electrostatic field of AC lines – Effect of high electrostatic field on biological organisms and human beings - Surface voltage gradients and maximum gradients of actual transmission lines – Voltage gradients on sub conductor.

UNIT-III: Electrostatic Induction in Un-energized Lines

Measurement of field and voltage gradients for three phase single and double circuit lines – Un-energized lines. Power frequency voltage control and over-voltages in EHV lines: No load voltage – Charging currents at power frequency-Voltage control – Shunt and series compensation – Static VAR compensation.

UNIT-IV: Corona in E.H.V. lines

Corona loss formulae- Attenuation of traveling waves due to corona – Audio noise due to corona, its generation, Characteristic and limits. Measurements of audio noise radio interference due to corona - Properties of radio noise – Frequency spectrum of RI fields – Measurements of RI and RIV.

UNIT-V: Design of EHV Lines based on Steady State and Transient Limits

EHV cables and their characteristics: Introduction, Electrical Characteristics of EHV Cables, Properties of Cable-Insulation Materials, Design basis of cable insulation, Tests on Cable characteristics.

TEXTBOOKS:

1. R. D. Begamudre, “EHVAC Transmission Engineering”, New Age International (p) Ltd, Revised Third Edition, 2006.
2. S. Rao, “HVAC and DC Transmission”, Khanna Publishers, New Delhi, Third Edition.
3. Subir Ray, “An Introduction to High Voltage Engineering”, Prentice Hall of India Private Limited, Seventh Printing, Second Edition, 2013.

REFERENCES:

1. Luces M. Fualkenberry, Walter Coffer, “Electrical Power Distribution and Transmission”, Pearson Education, Third Edition, 2008.
2. B.R.Gupta, “Power System Analysis and Design”, A H Wheeler Publishing Company Limited, third Edition, 1998.
3. S.N. Singh, “Electric Power Generation, Transmission and Distribution”, Prentice Hall of India Pvt. Ltd, New Delhi, second Edition, 2011.
4. Edison, “EHV Transmission line”- Electric Institution (GEC 1968).
5. Kimbark E.W. “Direct Current Transmission”, Wiley Interscience, Vol.I, Wiley, 1971.

Course outcomes:

The student will be able to:

1. List the necessity of EHV AC transmission, choice of voltage for transmission, line losses and power handling capability.
2. Estimate the Statistical procedures for line designs, scientific and engineering principles in power systems.
3. Understand the voltage gradients of conductor
4. Construct commercial transmission system.
5. Analyze the effects of corona.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

(F422D) UTILIZATION OF ELECTRICAL ENGINEERING
(PROFESSIONAL ELECTIVE - VI)

Course Objectives:

The student will

1. Comprehend the different issues related to heating
2. Comprehend the different issues related to welding and illumination
3. Provide the students the fundamental concepts of drives and types of drives used in traction.
4. Gain good engineering breadth so as to analyze the accessing techniques for braking system implementation in traction
5. Knowledge on electrical traction systems.

UNIT-I: Illumination

Illumination: Definitions, types of lighting schemes, Incandescent lamps and fluorescent lamps polar curves, effect of voltage variation on efficiency and life of lamps, Distribution and control of light, lighting calculations, solid angle, Laws of Illumination-calculations, discharge lamps: Sodium Vapour and Mercury Vapour Lamps, merits of LED Lamps - Illumination Design –Indoor lighting, factory lighting, flood lighting and street lighting-problems

UNIT-II: Heating And Welding

Electrical heating-advantages, methods and applications, Resistance heating, design of heating element, efficiency calculations. Induction heating: Core type and Core less furnaces and high frequency eddy current heating, dielectric heating: principle and applications - Problems, Arc furnaces: Direct arc and Indirect arc furnaces-Problems. Electric welding- types, merits and demerits.

UNIT-III: Electric Drives

Introduction to Electric vehicle, Types of electric drives, choice of motor, starting and running characteristics, speed control, Methods of Electric Braking: Plugging, Rheostatic and Regenerative Braking. Temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

UNIT-IV: Electric Traction (Part – I)

Traction Systems: types, Electric traction. Modern 25 KV A.C. single phase traction systems: advantages, equipment and layout of 25 KV single phase A.C. traction system.
Simplified speed time curves, Average and scheduled speed - Quadrilateral and Trapezoidal speed time curves-Problems.

UNIT-V: Electric Traction (Part – II)

Mechanics of train movement: Adhesive Weight, coefficient of Adhesion, attractive effort and specific energy consumption, factors affecting specific energy consumption-problems.

TEXTBOOKS:

1. E. Openshaw Taylor, “Utilization of Electric Energy”, Orient Longman private limited, 1971.
2. Partab, “Art & Science of Utilization of electrical Energy”, Dhanpat Rai & Sons

REFERENCES:

1. N.V.Suryanarayana, “Utilization of Electrical Power including Electric drives and Electrictraction”, New Age International (P) Limited, Publishers, 1996.
2. C.L. Wadhwa, “Generation, Distribution and Utilization of electrical Energy”,New Age International (P) Limited, Publishers, 1997.
3. J. B. Gupta, “Utilization of Electrical Power”, Kataria publishers.

Course outcomes:

The student will be able to:

1. Able to identify a heating/ welding scheme for a given application.
2. Able to maintain/ Trouble shoot various lamps and fittings in use.
3. Analyze the characteristics of electric drives used in an industry.
4. Evaluate different schemes of traction schemes and its main components.
5. Identify the job/higher education / research opportunities in Electric Utilization industry.

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UGC AUTONOMOUS

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

(F422E) ADVANCED CONTROL SYSTEMS
(PROFESSIONAL ELECTIVE - VI)

Course Objectives:
The Student will:

1. Memorise the basics of state space technique of the system and Study the stability of Non-Linear and Linear systems.
2. Obtain the transfer function from state model and solution of state equation
3. Know how to achieve stability improvements by pole placement technique
4. Understand the behaviour of non-linear systems
5. Design P, PI, PID, controllers & different soft computing techniques

UNIT-I : State Space Analysis
State Space Representation, Solution of State Equation, State Transition Matrix, Canonical Forms – Controllable Canonical Form, Observable Canonical Form, Jordan Canonical Form.
UNIT-II : Controllability and Observability
Tests for controllability and observability for continuous time systems – Time varying case, minimum energy control, time invariant case, Principle of Duality, Controllability and observability form Jordan canonical form and other canonical forms.

UNIT-III: Describing Function Analysis
Introduction to nonlinear systems, Types of nonlinearities, describing functions, describing function analysis of nonlinear control systems.

Phase-Plane Analysis:
Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase-plane analysis of nonlinear control systems.
UNIT-IV: Stability Analysis
Stability in the sense of Lyapunov. Lyapunov's stability and Lypanov's instability theorems. Direct method of Lypanov for the Linear and Nonlinear continuous time autonomous systems.

Calculus Of Variations:
Minimization of functionals of single function, Constrained minimization. Minimum principle. Control variable inequality constraints. Control and state variable inequality constraints. Euler Lagrangine Equation.

UNIT-V: Modal Control
Effect of state feedback on controllability and observability, Design of State Feedback Control through Pole placement. Full order observer and reduced order observer.
Optimal Control: Formulation of optimal control problem. Minimum time, Minimum energy, minimum fuel problems. State regulator problem. Output regulator problem. Tracking problem, Continuous-Time Linear Regulators.

TEXTBOOKS:

1. M. Gopal, "Modern Control System Theory" New Age International Publishers, 2nd edition, 1996.
2. K. Ogata, "Modern Control Engineering" Prentice Hall of India, 3rd edition, 1998

REFERENCES:

1. I.J. Nagarath and M.Gopal, "Control Systems Engineering" New Age International (P) Ltd.
2. M.Gopal, "Digital Control and State Variable Methods" Tata McGraw-Hill Companies, 1997.
3. Stainslaw H. Zak, "Systems and Control"Oxford Press, 2003.

Course outcomes:

The student will be able to:

1. Analyse the system, modelling and representation using state space model
2. Evaluate the controllability & observability.
3. Design of the state regulator and state observer
4. Improve the stability of non-linear systems with different approaches
5. Implement the tuning methods for PID controllers

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AUTONOMOUS

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

(F422F) HVDC TRANSMISSION
(PROFESSIONAL ELECTIVE - VI)

Course Objectives:
The Student will:

1. Evaluate technical and economical aspects of HVDC transmission.
2. Develop of HVDC converter.
3. Know about VSC HVDC control.
4. Identify the impact of AC system performance on DC system.
5. Analyse harmonics and their rectification.

UNIT-I : Basic Concepts

Necessity of HVDC systems, Economics and Terminal equipment of HVDC transmission systems, Types of HVDC Links, Apparatus required for HVDC Systems, Comparison of AC and DC Transmission, Application of DC Transmission System, Planning and Modern trends in D.C. Transmission.

Analysis of HVDC Converters

Choice of Converter Configuration, Analysis of Graetz circuit, Characteristics of 6 Pulse and 12 Pulse converters, Cases of two 3 phase converters in Y/Y mode – their performance.

UNIT-II : Converter and HVDC System Control

Principle of DC Link Control, Converters Control Characteristics, Firing angle control, Current and extinction angle control, Effect of source inductance on the system, Starting and stopping of DC link, Power Control.

Reactive Power Control in HVDC

Introduction, Reactive Power Requirements in steady state, sources of reactive power-Static VAR Compensators, Reactive power control during transients.

UNIT-III: Power Flow Analysis in AC/DC Systems

Modeling of DC Links, DC Network, DC Converter, Controller Equations, Solution of DC load flow, P.U. System for DC quantities, solution of AC-DC Power flow- Simultaneous method-Sequential method.

UNIT-IV: Converter Faults and Protection

Converter faults, protection against over current and over voltage in converter station, surge arresters, smoothing reactors, DC breakers, Audible noise, space charge field, corona effects on DC lines, Radio interference.

UNIT-V: Harmonics

Generation of Harmonics, Characteristics harmonics, calculation of AC Harmonics, Non-Characteristics harmonics, adverse effects of harmonics, Calculation of voltage and Current harmonics, Effect of Pulse number on harmonics.

Filters

Types of AC filters, Design of Single tuned filters –Design of High pass filters.

TEXTBOOKS:

1. K.R.Padiyar, "HVDC Power Transmission Systems: Technology and system Interactions" New Age International (P) Limited, andPublishers.
2. S K Kamakshaiah, V Kamaraju, "HVDC Transmission" TMHPublishers.

REFERENCES:

1. S.Rao "EHVAC and HVDC Transmission Engineering and Practice".
2. Jos Arrillaga, "HVDC Transmission" The institution of electrical engineers, IEE power & energy series 29, 2nd edition.
3. E.W.Kimbark, "Direct Current Transmission" John Wiley and Sons.

Course outcomes:

The student will be able to:

1. Compare the differences between HVDC and HVAC transmission.
2. Analyze the rectifier and inverter commutating circuits.
3. Identification of valve firing control schemes.
4. Estimate the requirement of HVDC filters.
5. Observe the role of AC system faults on HVDC system and Know about VSC transmission advantages.

Open Elective – I

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
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

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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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UGC AUTONOMOUS

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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UGC AUTONOMOUS

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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	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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UGC AUTONOMOUS

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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UGC AUTONOMOUS

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

J. B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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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UGC AUTONOMOUS

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

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

(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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

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

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

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.

J. B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

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.

J.B INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

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

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

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

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

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

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

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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.

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

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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
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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B.Tech :	**L**	**T-P-D**	**C**
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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
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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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

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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UGC AUTONOMOUS

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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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.

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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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UGC AUTONOMOUS

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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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

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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

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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UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
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.

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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