ACADEMIC REGULATIONS
PROGRAM STRUCTURE
AND
DETAILED SYLLABUS

ELECTRICAL AND ELECTRONICS ENGINEERING

For

CBCS BASED B.TECH. FOUR YEAR DEGREE PROGRAM

(Applicable for the batches admitted from AY 2018-19)

(I-IV Years Syllabus)

Geethanjali College of Engineering and Technology

(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with "A" Grade)

Cheeryal(V), Keesara(M), Medchal(Dist.), Telangama-501 301

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

CONTENTS

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ACADEMIC REGULATIONS 2018

For CBCS Based B.Tech PROGRAM

(Effective for the students admitted into FIRST year from the Academic Year **2018-19**)

1. Under-Graduate Degree Programme (B.Tech) in Engineering

Geethanjali College of Engineering and Technology (GCET) offers **four (**4) Year (**eight** (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

S. No.	***Branch***
I.	Civil Engineering
II.	Computer Science and Engineering
III.	Electrical and Electronics Engineering
IV.	Electronics and Communication Engineering
V.	Mechanical Engineering
VI.	Information Technology

2. Eligibility for Admission

2.1 Admission to the B.Tech Programme shall be made either on the basis of the merit rank obtained by the qualifying candidate at an Entrance Test conducted by the Telangana State Government (EAMCET), OR the JNTUH, OR on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the Government of Telangana from time to time.

2.2 The medium of instruction for all the B.Tech programmes shall be ENGLISH only.

3. B.Tech Programme Structure

3.1 A student after securing admission shall complete the B.Tech programme in a minimum period of **four (4)** academic years (**eight** (8) semesters), and a maximum period of **eight (8)** academic years (**sixteen** (16) semesters) starting from the date of commencement of first year first semester (soon after securing admission), failing which student shall forfeit seat in B.Tech program. Each student shall secure 160 credits (with CGPA $\geq$ 5) required for the completion of the undergraduate 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, are as listed below.

3.2.1 **Semester Scheme:**

Each B.Tech program is of **four** (4) academic years (**eight** (8) semesters**)**, with each academic year being divided into two semesters of **20 weeks (minimum of 90 working days)** each. Each semester has - '**Continuous Internal Evaluation (CIE)**' and '**Semester End Examination (SEE)**'. **Choice Based Credit System (CBCS)** and **Credit Based Semester System (CBSS)** as denoted by UGC and curriculum / programme structure as suggested by AICTE are followed.

3.2.2 **Credit Courses:**

All courses are to be registered by a student in a semester to earn credits. Credits shall be assigned to each course in a L: T: P/D: C (Lecture periods: Tutorial periods: Practicals / Drawing periods: Credits) structure, based on the following general pattern:

- One credit - for one hour / week / semester for Theory / Lecture (L) / Tutorial(T) courses;
- One-half (½) of a credit – for one hour / week / semester for Laboratory / Practical (P) Courses or Drawing Periods (D).
- No Credits for mandatory courses.
- Other student activities (co-curricular and extra-curricular), namely, NCC, NSS, NSO, Study Tour, Guest Lecture etc. and identified Mandatory Courses, if any, shall not carry credits.

3.2.3 **Course Classification:**

All courses offered for the B.Tech programme are broadly classified as: (a) Foundation Courses (FnC), (b) Core Courses (CoC), and (c) Elective Courses (Eℓ C).

- Foundation Courses (FnC) are further categorized as : (i) HSMC (Humanities and Social Sciences including Management Courses), (ii) BSC (Basic Science Courses), and (iii) ESC (Engineering Science Courses);
- Core Courses (CoC) and Elective Courses (Eℓ C) are categorized as PS (Professional Courses), which are further subdivided as – (i) PCC (Professional/ Departmental Core) Courses, (ii) PE (Professional/ Departmental Electives), (iii) OE (Open Electives); (iv) Technical Seminar, (v) Mini project and (vi) Project Work (PW) and (vii) Internship;
- Mandatory course(s) (MC – Non credit oriented)

S. No	Broad Course Classification	Course Group/Category	Course Description
1	Foundation Courses (FnC)	BSC-Basic Science Courses	Includes Mathematics, Physics and Chemistry courses
2		ESC-Engineering Science Courses	Includes Fundamental Engineering Courses
3		HSMC-Humanities and Social sciences including Management Courses	Includes courses related to Humanities, Social Sciences and Management
4	Core Courses (CoC)	PCC-Professional Core Courses	Includes core courses related to parent discipline/department/ branch of Engineering
5	Elective Courses (Eℓ C)	PEC-Professional Elective Courses	Includes elective courses related to parent discipline / related department / branch of Engineering
6		OEC-Open Elective Courses	Elective Courses which include interdisciplinary courses or courses in an area outside the parent discipline/department /branch of engineering
7	Core Courses	Project Work	B.Tech Project
8		Internship/Mini-Project/ Technical Seminar	Internship/Mini- Project/Technical Seminar

4 Course Registration

4.1 A 'Faculty Advisor or Counselor' shall be assigned to a group of 20 students, who shall advise him about the B.Tech programme, its structure along with curriculum, choice / option for course(s), based on his competence, progress, pre-requisites and interest.

4.2 A Student may be permitted to register for course(s) of his CHOICE with a typical total of 20 credits per semester (minimum being 16 credits and maximum being 24 credits, permitted deviation being ± 20%), based on his PROGRESS and SGPA/ CGPA, and study of the 'PRE-REQUISITES' as indicated for various Course(s), in the Department Course Structure and Syllabus contents. However, a MINIMUM of 16 Credits per Semester must be registered to ensure the 'STUDENTSHIP' in any Semester.

4.3 A student must register for all the course(s) in a semester as specified in the program structure, before registering for any extra course(s), from the program structure, subject to **a maximum of four** (4) **more credits** with the approval of the faculty advisor.

4.4 If any theory course(s) has an associated laboratory / practical course, while registering for such course(s), the student shall register for laboratory / practical course(s) along with the corresponding theory course(s) in the same semester**.**

4.5 Student's choice for 'extra course(s)' to reach the Maximum Permissible Limit of 24 Credits (above the typical 20 Credit norm) must be clearly indicated, which needs the specific approval and signature of the Faculty Advisor/ Counselor**.**

4.6 Academic section of the college invites 'Registration Forms' from students a priori (before the beginning of the semester). Registration requests for any 'CURRENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examinations) of the 'PRECEDING SEMESTER'.

4.7 A student can apply for registration, ONLY AFTER obtaining the 'WRITTEN APPROVAL' from his faculty advisor, which should be submitted to the College Academic Committee through Head of the Department concerned (a copy of the same being retained with Head of the Department, Faculty Advisor and the student).

4.8 If the student submits ambiguous choices or multiple options or erroneous entries - during registration for the course(s) under a given / specified course(s) Group/ Category, namely, core elective with laboratory, professional elective and open elective as listed in the programme structure, Faculty Advisor shall rectify such errors and advise the student accordingly.

4.9 Course(s) options exercised by the student and approved by Faculty Advisor are final and CANNOT be changed, or inter-changed. Further, alternate choices shall also not be considered. However, if the course(s) that has (have) already been listed for registration (by the department) in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice: either for new course(s) (subject to offering of such course(s)), or for another existing course(s) offered, which may be considered. Such alternate arrangements shall be made by the department, with due notification and time-framed schedule, within the FIRST WEEK from the commencement of class-work for that semester.

4.10 Dropping of course(s) may be permitted, only after obtaining prior approval from the faculty advisor / counselor 'within a period of 15 days' from the beginning of the current semester.

4.11 Open electives: The students have to choose open electives from the list of open electives given. However, the student cannot opt for an open elective course(s) offered by his own (parent) department.

4.12 Professional electives: The students have to choose the required professional electives from the list given.

5 Courses to be offered

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

5.2 A Course may be offered to the students, ONLY IF a Minimum of 20 students (1/3 of the Section Strength) opts for the same. The maximum strength of a section is limited to 80 (60 + 1/3 of the section strength).

5.3 More than **one Instructor** may offer the **same course(s)** (laboratory / practical may be included with the corresponding theory course(s) in the same semester) in any semester. However, selection of choice for students **shall be based on - 'first come first serve basis and CGPA criterion'**.

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

5.5 In case of options coming from students of other departments / branches / disciplines (not considering OPEN ELECTIVES), PRIORITY shall be given to the student of the 'Parent Department'.

6 Attendance Requirements

6.1 A student shall be eligible to appear for the semester end examinations, if the student acquires a minimum of 75% attendance in aggregate of all the courses (excluding attendance in mandatory course(s) such as Environmental Science, Constitution of India, Intellectual Property Rights, Professional Ethics and Gender Sensitization lab) registered for in that semester.

6.2 A student shall acquire a minimum of 75% attendance in each mandatory course. If he fails to acquire a minimum of 75% attendance in mandatory course(s), such student is deemed to have failed in that mandatory course(s) and shall re-register for such course(s) as and when offered next. Condonation of attendance is not allowed in mandatory course(s).

6.3 Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on valid medical grounds, or participation in sports, games, NCC, NSS, other co-curricular and extra-curricular activities, recognized for the purpose, and the participation having prior approval of the competent authority. Such condonation shall be based on the student's representation with supporting evidence.

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

6.5 Shortage of attendance below 65% in aggregate shall in "**NO"** case be condoned.

6.6 Students, whose shortage of attendance is not condoned in any semester, are not eligible to take their Semester End Examinations. They get detained and their registration for that semester shall stand cancelled. They shall not be promoted to the next semester. They may seek re-registration for all those course(s) registered in that semester in which they were detained, by seeking re-admission into that semester as and when offered. In the case of elective course(s), namely, professional elective(s) and / or open elective(s), the same may also be re-registered, if offered. However, if those elective(s) are not offered in later semesters, then alternate elective(s) may be chosen from the SAME set of elective course(s) offered under that specific category.

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

7 Academic Requirements

The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in section 6.

7.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course, if the student secures not less than 35% marks (e.g. 25 out of 70 marks in theory/laboratory/practical/drawing course(s)) in the Semester End Examination, and a minimum of 40% of marks in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of letter grades, this implies securing Pass (C) Grade or above in that course(s).

7.2 Academic requirements in respect of Internship, Mini-Project, Technical Seminar, Project and mandatory non-credit course(s) are as follows:.

7.2.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Internship, if the student secures not less than 40% of the total marks allocated for the course. The student is deemed to have failed, if he does not submit a report on his Internship or does not make a presentation of the same before the Departmental Evaluation Committee as per schedule or secures less than 40% of marks in Internship evaluation.

7.2.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Mini Project, if the student secures not less than 40% of the total marks allocated for the course(s). The student is deemed to have failed, if he does not submit a report on his Mini Project or does not make a presentation of the same before the Departmental Evaluation Committee as per schedule or secures less than 40% of marks in Mini Project evaluation.

7.2.3 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Technical Seminar, if the student secures not less than 40% of the total marks allocated for the course(s). The student is deemed to have failed, if he does not submit a report on his Technical Seminar or does not make a presentation of the same before the Departmental Evaluation Committee as per schedule or secures less than 40% of marks in Technical Seminar evaluation.

7.2.4 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Project, if the student secures not less than 40% of the total marks allocated for the course(s). The student is deemed to have failed, if he does not submit a report on his Project or does not make a presentation of the same before the Departmental Evaluation Committee as per schedule or secures less than 40% of marks in Project evaluation.

Note: He may reappear once for each of the above evaluations (mentioned in 7.2.1 to 7.2.4), when they are scheduled again; if he fails in such 'one reappearance evaluation also', he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

7.2.4.1 For mandatory / non-credit course(s), 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 course(s) in addition to satisfying the attendance requirements mentioned in section 6.2.

7.2.4.2 No marks / letter grades shall be allotted for mandatory/non-credit course(s). Only Pass / Fail shall be indicated in Grade Card.

7.2.4.3 If a student fails in mandatory / non-credit course(s), he shall re-register for that course(s) as and when offered next.

7.3 **Promotion Rules**

S. No.	Promotion	Conditions to be fulfilled
1	First year First semester to First year Second semester	Regular course of study of First year First semester.
2	First year Second semester to Second year First semester	(i) Regular course of study of First year Second semester. (ii) Must have secured at least 50% (20 out of 40 credits) of the credits specified in the program structure of first year (up to and including first year second semester), from all the relevant regular and supplementary examinations, whether the student takes those examinations or not (even if the student registers for less than 40 credits, student must still secure a minimum of 20 credits).
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 60% (48 out of 80 credits) of the credits specified in the program structure of second year (up to and including second year second semester), from all the relevant regular and supplementary examinations, whether the student takes those examinations or not (even if the student registers for less than 80 credits, student must still secure a minimum of 48 credits).
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 60% (72 out of 120 credits) of the credits specified in the program structure of third year (up to and including third year second semester), from all the relevant regular and supplementary examinations, whether the student takes those examinations or not (even if the student registers for less than 120 credits, student must still secure a minimum of 72 credits).
7	Fourth year First semester to Fourth year Second semester	Regular course of study of Fourth year First semester.

7.4 A student shall register for all course(s) covering 160 credits as specified and listed in the Programme Structure, fulfills the Attendance and Academic requirements for 160 Credits securing a minimum of C Grade (Pass Grade) or above in each course(s), and 'earns ALL 160 Credits securing an SGPA ≥ 5.0 (in each Semester), and CGPA (at the end of each successive Semester) ≥ 5.0, in addition to fulfilling the academic requirements of mandatory course(s), to successfully complete the B.Tech Programme. The performance of the student in these 160 credits shall be taken into account for the calculation of the final CGPA (at the end of undergraduate programme), and shall be indicated in the grade card of IV year II semester.

7.5 Students who fail to earn 160 credits as per the Programme Structure, and as indicated above, within 8 academic years from the date of commencement of their I Year shall forfeit their seats in B.Tech Programme and their admissions shall stand cancelled.

7.6 A student detained due to shortage of attendance in any semester, may be re-admitted into that semester, as and when offered, with the Academic Regulations of the batch into which he gets readmitted. However, no grade allotments or SGPA/ CGPA calculations shall be done for the corresponding semester in which he got detained.

7.7 A student detained due to lack of credits in any year, may be readmitted in the next year, after fulfillment of the Academic Requirements, with the Academic Regulations of the batch into which he gets readmitted.

7.8 A student eligible to appear in the Semester End Examination in any course(s), but absent at it or failed (thereby failing to secure C Grade or above), may reappear for that course(s) at the supplementary examination as and when conducted. In such cases, his Internal Marks (CIE) assessed earlier for that course(s) shall be carried over, and added to the marks he obtains in the supplementary examination, for evaluating his performance in that course(s).

8 Evaluation - Distribution and Weightage of Marks

8.1 The performance of a student in each semester shall be evaluated course-wise (irrespective of credits assigned) with a maximum of 100 marks for all types of course(s), namely, theory, drawing, practicals, Technical seminar, Project, Mini-Project, Internship etc. and their evaluation is as follows:

8.1.1 Theory, practical, drawing and Project course(s) shall be evaluated based on 30% CIE (Continuous Internal Evaluation) and 70% SEE (Semester End Examination),

8.1.2 Internship/Technical seminar shall be evaluated based on 100% CIE (Continuous Internal Evaluation)

8.1.3 Mini-project shall be evaluated based on 100% SEE (Semester End Examination)

Note: A letter grade corresponding to the % marks obtained shall be given for all course(s) as mentioned in section 9.2.

8.2 For theory course(s), during the semester, there shall be TWO (2) mid-term examinations for 25 marks each. Each mid-term examination consists of one objective paper for TEN (10) marks, plus one subjective paper for FIFTEEN (15) marks, with duration of 120 minutes (20 minutes for objective and 100 minutes for subjective papers). Further, there shall be an allocation of five (5) marks for assignment. The objective paper is set with multiple choice questions, and / or True / False, and /or fill-in the blanks, and / or matching type questions. Subjective paper shall contain 3 questions, one from each unit or part thereof, with internal choice, each for 5 marks. All three questions are to be answered.

8.2.1 The first mid-term examination shall be conducted for the first 50% of the syllabus, and the second mid-term examination shall be conducted for the remaining 50% of the syllabus.

8.2.2 The first set of assignments should be submitted before the conduct of the first mid-term examinations, and the second set of assignments should be submitted before the conduct of the second mid-term examinations. The assignments shall be as specified by the course instructor concerned.

8.2.3 The first mid-term examination marks and average of the marks of the first set of assignment shall make one set of CIE marks, and the second mid-term examination marks and the average of the marks of the second set of assignment shall make second set of CIE Marks; and the average of these two sets

of marks shall be taken as the final marks secured by the student in the Continuous Internal Evaluation in that theory course(s).

8.2.4 The details of the question paper pattern for Semester End Examination (SEE) shall be as follows:

- The examination shall be conducted for 70 marks. The question paper consists of two parts:
  - Part – A for 20 marks (Compulsory);
  - Part – B for 50 marks (Questions with Internal Choice);
- Part – A: Part A shall consist of ten questions, two from each unit of the prescribed syllabus of the course(s). Each question carries 2 marks. All questions are compulsory.
- Part – B: Part B shall consist of five questions, one each from the five units of the prescribed syllabus of the course(s). Each question carries 10 marks and may contain sub-questions. For each question, there shall be an internal choice (it means, there shall be two questions from each unit, and the student shall answer either of the questions). The student shall answer all the questions of Part B.

8.2.5 **Absence in mid-term examination(s):**

- If any student is absent in one mid-term examination for any course(s) on any valid reasons certified by the Head of the Department concerned, one written test shall be conducted on all units by the college in each course(s) at the end of the semester.
- If any student is absent in both mid-term examinations for any course(s) on any valid reasons certified by the Head of the Department concerned, only one written test for 25 marks shall be conducted on all units by the college in each course at the end of the semester, and the marks secured out of 25 shall be divided by two, shall be awarded against the said mid-term examination(s).
- A prescribed fee shall be payable by the student for appearing in the above mentioned written test.

8.2.6 For laboratory / practicals / drawing course(s), there shall be a Continuous Internal Evaluation (CIE) during the semester for 30 marks, and 70 marks are assigned for laboratory / practical Semester End Examination (SEE). Out of the 30 marks for CIE, day-to-day work in the laboratory / practical shall be evaluated for 15 marks; and for the remaining 15 marks - two internal practical tests (each of 15 marks) shall be conducted by the concerned laboratory instructor, one at the end of 8 weeks and the other in the last week of the semester. The average of these two tests is taken into account. The SEE for practicals shall be conducted at the end of the semester by two examiners, namely, an external examiner and laboratory faculty as internal examiner. The external examiner shall be appointed by the Chief Superintendent of Examinations of the college as per the recommendation of the Chairperson, Board of Studies of the department concerned. The panel of the external examiners shall be provided by the Chairperson, BoS at the commencement of the semester during the meeting of the BoS

Absence in laboratory/practical internal examinations:

- If any student is absent in one laboratory internal examination for any laboratory course for any valid reasons certified by the Head of the Department concerned, one test shall be conducted for 15 marks covering all experiments of that laboratory course, by the college at the end of the semester.
- If any student is absent in both the laboratory internal examinations for any valid reasons certified by the Head of the Department concerned, only one test shall be conducted covering all experiments and the marks secured out of 15 marks shall be divided by two, which shall be awarded against the said lab internal examinations.

8.2.7 For the course having design and / or drawing (such as Engineering Graphics), the distribution shall be 30 marks for CIE (15 marks for day-to-day work, and 15 marks for internal tests) and 70 marks for SEE (question paper pattern shall be same as for theory examinations). There shall be two internal examinations in a semester and the average of the two shall be considered for the award of marks for internal examinations.

8.2.7.1 If any student is absent in the internal examination in design and / or drawing (such as Engineering Graphics) for any valid reasons certified by the Head of the Department concerned, one internal examination shall be conducted for 15 marks on all experiments of that laboratory / practical course(s), by the college at the end of the semester.

8.2.8 **Internship, Mini-Project, Technical Seminar and Project**

8.2.8.1 There shall be an internship, which the student shall carryout immediately after Second year second semester examinations and pursue it during summer vacation for a duration of four weeks. Internship carried out shall be submitted in a report form, and a presentation of the same shall be made before a committee, which evaluates it for 100 marks. The committee shall consist of Head of the Department, the supervisor allocated for the internship, and two Professors / Assoc-Professors of the department. There shall be only CIE for 100 marks for internship and shall be evaluated during third year first semester. There shall be no SEE for Internship.

8.2.8.2 There shall be a Mini Project, which the student shall carryout immediately after Third year second semester examinations and pursue it during summer vacation. Mini Project shall be submitted in a report form, duly approved by the departmental internal evaluation committee, and presented before the examination committee in Fourth year first semester. It shall be evaluated for 100 marks as SEE. The examination committee consists of an external examiner, Head of the Department, supervisor of the mini project and a senior faculty member of the department. There shall be no internal marks (CIE) for Mini Project.

8.2.8.3 There shall be a technical seminar presentation in Fourth year second semester, for which, the student shall collect the information on a specialized topic, prepare a technical report, submit it and present the same before a departmental committee. It shall be evaluated by the departmental committee, consisting of Head of the Department, seminar supervisor and a senior professor. The technical seminar report shall be evaluated for 100 marks as CIE. There shall be no SEE for the technical seminar.

8.2.8.4 There shall be a project, which the student shall carryout in final year second semester. There shall be three reviews, one at the end of the fourth week, another at the end of the ninth week and third at the end of the fourteenth week. The reviews shall be conducted and evaluated by an internal project review committee. The committee shall consist of Head of the Department, the supervisor allocated for the project, and two Professors /Assoc-Professors of the department. Each review shall be evaluated for thirty (30) marks and average of all three reviews shall constitute CIE of thirty (30) marks. Project carried out shall be submitted in a dissertation form, and a presentation of the same shall be made before a final examination committee consisting of Head of the Department, the supervisor and an external examiner, appointed by the chief superintendent of examinations, selected from a panel of examiners suggested by the chairperson, BoS, which evaluates it for seventy (70) marks.

9 Grading procedure

9.1 Grades shall be awarded to indicate the performance of students in each theory course, laboratory / practicals / Engineering Graphics / Drawing, Technical Seminar, Internship, Mini-Project, Project. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in section 8 above, a corresponding letter grade shall be 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 shall be followed:

% of Marks Secured in a 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 course(s) shall be deemed to have '**failed**' and is required to reappear as a 'supplementary candidate' in the semester end examination, as and when conducted. However, the internal marks secured earlier in those course(s) shall remain the same.

9.4 A student, who has not appeared for an examination in any course(s), shall be awarded '**Ab**' grade in that course(s), and shall be deemed to have '**failed**' in that course(s). Such a student shall be required to reappear as a 'supplementary candidate' in the semester end examination, as and when conducted. However, the internal marks secured earlier in those course(s) shall remain the same.

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

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

9.7 A student passes a course, only when the student secures a **GP ≥ 5 ('C' grade or above)** in that course.

9.8 The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points (ΣCP) secured from all course(s) registered for in a semester, by the total number of credits registered for in that semester. SGPA is rounded off to **two decimal places**. SGPA is thus computed as

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

where 'i' is the course indicator index (takes into account all course(s) in a semester), 'N' is the number of courses '**registered**' for in that semester (as specifically required and listed under the

program structure of the parent department), C is the number of credits allotted to the i^{th} course, and G represents the grade points (GP) corresponding to the letter grade awarded for that i^{th} course.

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

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

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

Illustration of calculation of SGPA:

Course	Credits	Letter Grade	Grade Point	Credit Points
Course1	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
Total	**21**	**Total Credit Points**		**152**

SGPA = 152/21 = 7.24

Illustration of calculation of CGPA up to 3rd semester:

Semester	Course Title	Credits Allotted	Letter Grade Secured	Corresponding Grade Point	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 shall be followed for each subsequent semester until eighth semester. The CGPA obtained at the end of eighth 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 shall be used.

9.11 SGPA and CGPA of a semester shall be mentioned in the semester Memorandum of Grades if all courses of that semester are passed in the first attempt. Otherwise, the SGPA and CGPA shall be mentioned only on the Memorandum of Grades generated after the student has passed his last examination in that semester. However, mandatory course(s) will not be taken into consideration.

10. Passing Standards:

10.1 A student shall be declared **'SUCCESSFUL'** or **'PASSED'** in a semester, only when he gets a SGPA ≥ 5.00 (at the end of that particular Semester); and a student shall be declared **'SUCCESSFUL'** or **'PASSED'** in the entire B.Tech programme, only when he gets a CGPA ≥ 5.00, subject to the condition that he secures a GP ≥ 5 (C Grade or above) in every registered course(s) in each semester (during the entire B.Tech Programme) for award of the degree.

10.2 After the completion of each semester, a Grade Card or Grade Sheet (Memorandum of Grades) shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It shall show the details of the course(s) registered (course(s) code, title, number of credits, grade earned etc.), credits earned, SGPA, and CGPA.

11. Declaration of Results

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

11.2 For final % of marks equivalent to the computed final CGPA, the following formula shall be used:

% of Marks = (final CGPA – 0.5) x 10

12. Award of Degree

12.1 A student who registers for all the specified course(s) as listed in the programme structure, satisfies all the programme requirements, and passes all the examinations prescribed in the entire B.Tech programme, and secures the required number of 160 credits (with CGPA ≥ 5.0), within eight (8) academic years from the date of commencement of the first academic year, shall be declared to have **'QUALIFIED'** for the award of the B.Tech degree in branch of Engineering studied.

12.2 A student who qualifies for the award of the degree as listed in section 12.1, shall be placed in the following classes based on evaluation as per section 7.4:

12.2.1 Students with final CGPA (at the end of the B. Tech Programme) ≥ 8.00 and fulfilling the following conditions shall be placed in 'FIRST CLASS with DISTINCTION' -

i. should have passed all the courses in 'FIRST APPEARANCE' within the first four (4) academic years (or eight (8) sequential semesters) from the date of commencement of his first academic year,

ii. should have secured a CGPA ≥ 8.00, at the end of each of the eight (8) sequential semesters, starting from the FIRST year FIRST 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.

12.2.2 Students having final CGPA (at the end of B.Tech Programme) ≥ 8.00, but not fulfilling the above conditions shall be placed in 'FIRST CLASS'.

12.2.3 Students with final CGPA (at the end of the B.TECH Programme) ≥ 6.50 but < 8.00, shall be placed in 'FIRST CLASS'.

12.2.4 Students with final CGPA (at the end of the B.TECH Programme) ≥ 5.50 but < 6.50, shall be placed in 'SECOND CLASS'.

12.2.5 All other Students who qualify for the award of the degree (as per Section 12.1), with final CGPA (at the end of the B.Tech Programme) ≥ 5.00 but < 5.50, shall be placed in 'PASS CLASS'.

12.3 A student with final CGPA (at the end of the B.Tech Programme) < 5.00 shall not be eligible for the award of the degree.

12.4 Students fulfilling the conditions listed under section (iii) of 12.2.1 alone shall be eligible for the award of 'college rank' and / or 'gold/ silver/bronze medal'.

13. Withholding of Results

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

14.1 **General**

14.1.1 A Student who has discontinued for any reason, or has been detained for want of attendance as specified in section 6 or NOT promoted due to lack of required credits as specified in section 7, may be considered eligible for readmission to the same semester in which he got detained for want of attendance or promotion to the next year of study after securing the required number of credits, as detailed in sections 14.2 through 14.4 as the case may be.

14.2 **For students detained due to shortage of attendance**:

14.2.1. A Student who has been detained in FIRST year of R13/R15 Regulations of JNTUH due to lack of attendance, shall be permitted to join FIRST year FIRST Semester of AR18 Regulations of GCET and is required to complete the study of B.Tech programme within the stipulated period of eight academic years from the date of first admission in FIRST Year. The AR18 Academic Regulations of GCET are applicable to the student from the year and semester of readmission onwards.

14.2.2. A student who has been detained in any semester of SECOND, THIRD and FOURTH years of R13/R15 regulations of JNTUH for want of attendance shall be permitted to join the corresponding semester of AR18 regulations of GCET and is required to complete the study of B.Tech within the stipulated period of eight academic years from the date of first admission in FIRST Year. The AR18 Academic Regulations of GCET are applicable to the student from the year and semester of readmission onwards.

14.2.3. A student who has been detained in any semester of FIRST, SECOND, THIRD or FOURTH years of AR16 regulations of GCET for want of attendance shall be permitted to join the corresponding

semester of AR18 regulations of GCET and is required to complete the study of B.Tech within the stipulated period of eight academic years from the date of first admission in FIRST Year. The AR18 Academic Regulations of GCET are applicable to the student from the year and semester of readmission onwards.

14.3 **For students NOT promoted due to shortage of credits**:

14.3.1. A student of R13/R15 Regulations of JNTUH who has been detained due to lack of credits shall be promoted to the next semester under AR18 Regulations of GCET only after acquiring the required credits as per the corresponding regulations of his first admission. For subsequent promotions, the rule specified in section 14.4.4 shall be applicable. The student is required to complete the study of B.Tech within the stipulated period of eight academic years from the year of first admission in FIRST year. The AR18 Academic Regulations of GCET are applicable to a student from the year of readmission onwards.

14.3.2. A student of AR16 Regulations of GCET who has been detained due to lack of credits shall be promoted to the next semester under AR18 Regulations of GCET only after acquiring the required credits as per AR16 regulations. For subsequent promotions, the rule specified in section 14.4.4 shall be applicable. The student is required to complete the study of B.Tech within the stipulated period of eight academic years from the year of first admission in FIRST year. The AR18 Academic Regulations of GCET are applicable to the student from the year of readmission onwards.

14.4. For all students readmitted under AR18 Regulations of GCET:

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

14.4.2 If a student readmitted into AR18 Regulations has any course(s) to be studied in the semester of his re-admission or succeeding semesters with about 80% of the syllabus in common with course(s) he has studied under his previous regulations, that particular course(s) shall be substituted for by another course(s) by the college (see also section 14.4.3).

14.4.3 If a student taking readmission as per the provisions of section 14.1.1 had not studied in his previous semesters, any course(s) which is/are prescribed for study under AR18 Regulations (in any of the semester(s) preceding the semester of re-admission), he shall pass all such course(s) to meet the academic requirements of AR18 Regulations.
One or more of these course(s) may be offered as substitute course(s), as per section 14.4.2. Other course(s) not offered as substitute course(s) shall constitute **Additional Course(s)**, which the student must pass to meet the academic requirements for the award of the degree. *Method of evaluation of additional courses shall be the same as the one detailed in section 8*. The college may conduct remedial classes and internal examinations for the benefit of the student. The Academic Regulations of GCET, AR18, under which a student has been readmitted, shall be applicable to the student from that semester.

14.4.4 **Promotion Rule for students initially admitted into R13/R15 Regulations of JNTUH or AR16 Regulations of GCET and re-admitted into AR18 Regulations of GCET**

- To be eligible for promotion from FIRST year to SECOND year, a student must secure a minimum of 50% of the total credits assigned to all the courses he had studied, including substitute

courses but excluding Additional Courses, from all the examinations conducted, whether the student takes the examinations or not.

- To be eligible for promotion from SECOND year to THIRD year and THIRD year to FOURTH year, a student must secure a minimum of 60% of the total credits assigned to all the courses he had studied, including substitute courses but excluding Additional Courses, from all the examinations conducted, whether the student takes the examinations or not.
- For this purpose, if the number of credits secured so arrived at is not an integer, the fractional component shall be ignored if it is less than 0.5; else, it shall be rounded off to the next higher integer (e.g. 50.4 is taken as 50 and 50.5 is taken as 51).

14.4.5 The total number of credits that a student acquires for the award of degree, shall be the sum of all credits secured in all the regulations of his study including AR18 Regulations. Credits earned by the student in additional course(s), shall be considered only for award of B.Tech degree, but shall not be considered for calculating SGPA/CGPA.

15. Student transfers

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

15.2 The student seeking transfer from various other universities/institutions, if failed in any course(s) in his earlier regulations, has to pass equivalent courses as prescribed by JNTUH and also pass the courses of GCET which the student has not studied at the earlier institution. Further, even if the student had passed some of the courses at the earlier institutions, if the same courses are prescribed in different semesters of AR18 regulations of GCET, the student has to study and pass those courses in GCET in spite of the fact that those courses are repeated.

15.3 The transferred students from other universities/institutions shall be provided one chance to write the internal examinations in the failed courses and/or courses not studied as per the clearance (equivalence) letter issued by JNTUH.

16. Scope

i) Where the words “he”, “him”, “his”, occur in the write-up of regulations, they include “she”, “her”, “hers”.
ii) The Academic Regulations should be read as a whole, for the purpose of any interpretation.
iii) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Head of the Institution is final.
iv) The college may change or amend the Academic Regulations, Program Structure or Syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the dates notified by the College Authorities.
v) B.Tech (Regular) program is B.Tech 4 year degree program to which students are admitted to FIRST year
vi) B.Tech LE Scheme refers to the system under which students are admitted to SECOND year of the B.Tech FOUR (4) year degree program.
vii) The terms “mid-term” and “internal” are used interchangeably.

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Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

PUNISHMENT FOR MALPRACTICE

S. No.	Nature of Malpractices	Punishment
	If the candidate:	
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 course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
1 (b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he shall 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 course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester/year. The Hall Ticket of the candidate is to be cancelled.
3	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the courses of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and

		all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the impostor is an outsider, he shall be handed over to the police and a case is registered against him.
4	Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
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 organizes 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 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 case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they shall be handed over to the police and a police case is registered against them.

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

Geethanjali College of Engineering And Technology (Autonomous)
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ACADEMIC REGULATIONS 2018

For CBCS Based B.Tech (Lateral Entry (LE) Scheme

(Effective for the students admitted into SECOND year from the Academic Year **2019-20**)

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 120 credits and secure 120 credits with CGPA ≥ 5 from SECOND year through FOURTH 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, shall forfeit their seat in B.Tech
4. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech (LES).
5. **Promotion rule**

S. No.	Promotion	Conditions to be fulfilled
i.	Second year first semester to Second year second semester	Regular course of study of Second year first semester.
ii.	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 60% (24 out of 40 credits) of the credits specified in the program structure of second year (up to and including second year second semester), from all the relevant regular and supplementary examinations, whether the student takes those examinations or not (even if the student registers less than 40 credits student must still secure a minimum of 24 credits).
iii.	Third year first semester to Third year second semester	Regular course of study of Third year first semester.
iv.	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 60% (48 out of 80 credits) of the credits specified in the program structure of third year (up to and including third year second semester), from all the relevant regular and supplementary examinations, whether the student takes those examinations or not (even if the student registers less than 80 credits student must still secure a minimum of 48 credits).
v.	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. FOUR (4) - year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

Geethanjali College of Engineering And Technology (Autonomous)
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S. No.	Nature of Malpractices	Punishment
	If the candidate:	
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 course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
1 (b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he shall 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 course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester/year. The Hall Ticket of the candidate is to be cancelled.
3	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the courses of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course

		by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the impostor is an outsider, he shall be handed over to the police and a case is registered against him.
4	Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
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 organizes 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 written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they shall be handed over to the police and a police case is registered against them.

	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 part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is course to the academic regulations in connection with forfeiture of seat.
8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College shall be handed over to police and, a police case shall be registered against them.

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

Vision and Mission of the Institution

Vision:

Geethanjali visualizes dissemination of knowledge and skills to students, who would eventually contribute to well being of the people of the nation and global community.

Mission:

- To impart adequate fundamental knowledge in all basic sciences and engineering, technical and Inter-personal skills to students.
- To bring out creativity in students that would promote innovation, research and entrepreneurship.
- To Preserve and promote cultural heritage, humanistic and spiritual values promoting peace and harmony in society.

Vision and Mission of the Department

Vision:

To provide excellent Electrical and Electronics education by building strong teaching and research environment

Mission:

- To offer high quality graduate program in Electrical and Electronics education and to prepare students for professional career or higher studies.
- The department promotes excellence in teaching, research, collaborative activities and positive contributions to society

Program Educational Objectives

- To prepare students with excellent comprehension of mathematics, basic sciences and engineering subjects facilitating them to find gainful employment or pursue postgraduate program with an appreciation for lifelong learning.
- To inculcate problem solving capabilities in students with analysis, design and practical skills that are Program Specific which would facilitate them to exhibit creativity and innovation that would enable them to develop modern equipment with emerging technologies of multidisciplinary nature for societal development.
- To inculcate positive attitude, professional ethics, effective communication and interpersonal skills which would facilitate them to succeed in the chosen profession through research and development both as team member and as well as leader.

Programme Outcomes

PO1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes:

PSO1. An ability to simulate and determine the parameters like voltage profile and current ratings of transmission lines in Power Systems.

PSO2. An ability to understand and determine the performance of electrical machines namely, speed, torque, efficiency etc.

PSO3. An ability to apply electrical engineering and management principles to Power Projects.

Geethanjali College of Engineering And Technology (Autonomous)
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SCHEME OF INSTRUCTIONS AND EXAMINATION

B. TECH ELECTRICAL AND ELECTRONICS ENGINEERING

Academic Regulations: AR-18 **Academic Year 2018-19**

PROGRAMME STRUCTURE

FIRST YEAR SEMESTER-I

S. No.	Course Code	Course	Category	Number of Periods/ Week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	C
1	18EN1101	English	HSMC	3	-	-	30	70	100	3
2	18PH1102	Applied Physics	BSC	3	-	-	30	70	100	3
3	18MA1101	Mathematics –I	BSC	3	1	-	30	70	100	4
4	18CH1101	Engineering Chemistry	BSC	3	1	-	30	70	100	4
5	18CS1101	Programming for Problem Solving	ESC	2	-	-	30	70	100	2
6	18EN11L1	English Language and Communication Skills Lab	HSMC	-	-	3	30	70	100	1.5
7	18CH11L1	Engineering Chemistry Lab	BSC	-	-	3	30	70	100	1.5
8	18CS11L1	Programming for Problem Solving Lab	ESC	-	-	2	30	70	100	1
9		Induction Program	MC	-	-	-	-	-	-	-
Total				**14**	**2**	**8**	**240**	**560**	**800**	**20**
Total Periods Per Week				**24**						

Course code	Definitions
L	Lecture
T	Tutorial
P	Practical
D	Drawing
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional core courses
PEC	Professional Elective courses
OEC	Open Elective courses
LC	Laboratory course
MC	Mandatory course
PROJ	Project, Internship, Mini Project and Technical Seminar

FIRST YEAR SEMESTER-II

S. No.	Course Code	Course	Category	Number of Periods/ Week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	C
1	18PH1201	Semiconductor Devices	BSC	3	-	-	30	70	100	3
2	18MA1201	Mathematics –II	BSC	3	1	-	30	70	100	4
3	18MA1202	Computational Mathematics	BSC	3	-	-	30	70	100	3
4	18CS1201	Data Structures	ESC	2	-	-	30	70	100	2
5	18ME1202	Engineering Graphics	ESC	1	-	4	30	70	100	3
6	18PH12L1	Semiconductor Devices Lab	BSC	-	-	3	30	70	100	1.5
7	18MA12L1	Computational Mathematics Lab	BSC	-	-	2	30	70	100	1
8	18CS12L1	Data Structures Lab	ESC	-	-	2	30	70	100	1
9	18ME12L1	Engineering Workshop	ESC	-	-	3	30	70	100	1.5
Total				**12**	**1**	**14**	**270**	**630**	**900**	**20**
Total Periods Per Week				**27**						

SECOND YEAR SEMESTER-I

S. No.	Course Code	Course	Category	Number of Periods/ Week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	C
1	18MA2101	Complex Variables	BSC	3	-	-	30	70	100	3
2	18ME2103	Fluid Mechanics and Hydraulic Machinery	ESC	3	-		30	70	100	3
3	18EC2102	Digital Design	ESC	3	-	-	30	70	100	3
4	18EE2102	Electromagnetic Fields	PCC	3	1	-	30	70	100	4
5	18EE2103	Electrical Circuits	PCC	3	1	-	30	70	100	4
6	18ME21L2	Fluid Mechanics and Hydraulic Machinery Lab	ESC	-	-	2	30	70	100	1
7	18EC21L1	Digital Design Lab	ESC	-	-	2	30	70	100	1
8	18EE21L2	Electrical Circuits Lab	PCC	-	-	2	30	70	100	1
9	18CH2101	Environmental Science	MC	3	-	-	-	-	-	-
Total				**18**	**2**	**6**	**240**	**560**	**800**	**20**
Total Periods Per Week				**26**						

SECOND YEAR SEMESTER-II

S. No.	Course Code	Course	Category	Number of Periods/ Week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	C
1	18EE2201	Signals, Systems and Transform Techniques	PCC	3	-	-	30	70	100	3
2	18EE2202	Power systems –I	PCC	3		-	30	70	100	3
3	18EE2203	Network Theory	PCC	3	1		30	70	100	4
4	18EE2204	Electrical Machines-I	PCC	3	1	-	30	70	100	4
5	18MB2202	Engineering Economics and accounting	HSMC	3	-	-	30	70	100	3
6	18EE22L1	Signals, Systems and Transform Techniques Lab	PCC	-	-	2	30	70	100	1
7	18EE22L2	Network Theory Lab	PCC	-	-	2	30	70	100	1
8	18EE22L3	Electrical Machines-I Lab	PCC	-	-	2	30	70	100	1
9	18EN2201	Gender Sensitization	MC	-	-	3	-	-	-	-
Total				**15**	**2**	**9**	**240**	**560**	**800**	**20**
Total Periods Per Week				**26**						

THIRD YEAR SEMESTER-I

S. No.	Course Code	Course	Category	Number of Periods/ Week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	C
1	18EE3101	Power Systems - II	PCC	3	-	-	30	70	100	3
2	18EE3102	Electrical Machines-II	PCC	3	-	-	30	70	100	3
3	18EE3103	Control Systems	PCC	3	-	-	30	70	100	3
4	**Professional Elective – I**									
	18EE3104	Wind and Solar Energy Systems	PEC	3	-	-	30	70	100	3
	18EE3105	Special Machines								
	18EE3106	Electrical Energy Conservation and Auditing								
	18EE3107	Smart Grid/Micro Grid								
5	**Professional Elective – II**									
	18EE3108	Computer Methods in Power Systems	PEC	3	-	-	30	70	100	3
	18EE3109	Electrical Estimation and Costing								
	18EE3110	Industrial Electrical Systems								
	18CS3109	Computer Organization								
6	18EE31L1	Power Systems - II Lab	PCC	-	-	2	30	70	100	1
7	18EE31L2	Electrical Machines-II Lab	PCC	-	-	2	30	70	100	1
8	18EE31L3	Control Systems Lab	PCC	-	-	2	30	70	100	1
9	18EE3111	Internship	PROJ-I	-	-	-	100	-	100	2
Total				**15**	**-**	**6**	**340**	**560**	**900**	**20**
Total Periods Per Week				**21**						

THIRD YEAR SEMESTER-II

S. No.	Course Code	Course	Category	Number of Periods/ Week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	C
1	18EE3201	Power Electronics	PCC	3	1	-	30	70	100	4
2	18EC3208	Analog Circuits	ESC	3	1	-	30	70	100	4
3	18MB3201	Management fundamentals	HSMC	3	-	-	30	70	100	3
4	**Professional Elective – III**									
	18EE3202	Power System Operation and Control	PEC	3	-	-	30	70	100	3
	18EE3203	Control Systems Design								
	18EE3204	Electrical and Hybrid Vehicles								
	18EE3205	Robotics								
5	**Open Elective – I**									
	18CE3221	Global Warming and Climate Change	OEC	3	-	-	30	70	100	3
	18ME3223	Nano Materials and Technology								
	18EC3224	Electronic Measuring Instruments								
	18CS3225	JAVA Programming								
	18MB3226	Intellectual Property Rights								
6	18EN32L1	Advanced English Communication Skills (AECS) Lab	HSMC	-	-	2	30	70	100	1
7	18EE32L1	Power Electronics Lab	PCC	-	-	2	30	70	100	1
8	18EC32L3	Analog Circuits Lab	ESC	-	-	2	30	70	100	1
9	18MB3203	Professional Ethics	MC	3	-	-	-	-	-	
Total				**18**	**2**	**6**	**240**	**560**	**800**	**20**
Total Periods Per Week				**26**						

FOURTH YEAR SEMESTER-I

S. No.	Course Code	Course	Category	Number of Periods/ Week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	C
1	18EC4110	Microprocessors and Microcontrollers	ESC	3	-	-	30	70	100	3
2	18EE4101	Electrical Drives	PCC	3	-	-	30	70	100	3
3	18EE4102	Instrumentation and Measurement Techniques	PCC	3	-	-	30	70	100	3
4	**Professional Elective - IV**									
	18EE4103	Power System Protection	PEC	3	-	-	30	70	100	3
	18EE4104	Switched Mode Power Supplies								
	18EE4105	EHV AC Transmission Systems								
	18EE4106	Artificial Neural Networks and Fuzzy Systems								
5	**Open Elective – II**									
	18CE4131	Building Technology	OEC	3	-	-	30	70	100	3
	18ME4133	Digital Fabrication								
	18EC4134	Principles of Communication Systems								
	18CS4135	Knowledge Management								
	18MB4136	Supply Chain Management								
6	18EC41L4	Microprocessors and Microcontrollers Lab	ESC	-	-	2	30	70	100	1
7	18EE41L1	Electrical Drives Lab	PCC	-	-	2	30	70	100	1
8	18EE41L2	Instrumentation and Measurement Techniques Lab	PCC	-	-	2	30	70	100	1
9	18EE4107	Mini Project	PROJ-M	-	-	-	-	100	100	2
Total				**15**	**-**	**6**	**240**	**660**	**900**	**20**
Total Periods Per Week				**21**						

FOURTH YEARSEMESTER – II

S. No.	Course Code	Course	Category	Number of Periods/ Week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	C
1	**Professional Elective – V**									
	18EE4201	High Voltage Engineering	PEC	3	-	-	30	70	100	3
	18EE4202	Flexible AC Transmission Systems								
	18EE4203	Power Quality								
	18EC4206	Digital Signal Processing								
2	**Professional Elective – VI**									
	18EE4204	Utilization of Electrical Energy	PEC	3	-	-	30	70	100	3
	18EE4205	HVDC Transmission								
	18EE4206	Reliability Engineering								
	18EC4207	VLSI Technology								
3	**Open Elective – III**									
	18CE4241	Disaster Management	OEC	3	-	-	30	70	100	3
	18ME4243	Principles of Automobile Engineering								
	18EC4244	Biomedical Instrumentation								
	18CS4245	Data Base Systems								
	18MB4246	Entrepreneurship								
4	18EE4208	Technical Seminar	PROJ-TS	-	-	2	100	-	100	1
5	18EE4207	Project	PROJ	-	-	20	30	70	100	10
		Total		**9**	**-**	**22**	**220**	**280**	**500**	**20**
		Total Periods Per Week		**31**						

Comparison of Credit allocation:

S. No.	Category	Breakup of Credits by GCET	Suggested Breakup of Credits by AICTE
1.	Humanities and Social Sciences including Management courses	11.5	12
2.	Basic Science Courses	28	26
3.	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computers etc.	27.5	20
4.	Professional Core courses	51	53
5.	Professional Elective courses relevant to chosen specialization/branch	18	18
6.	Open subjects - Electives from other technical and/or elsewhere	9	18
7.	Project work, seminar and internship in industry or elsewhere	15	11
8.	Mandatory Courses (Environmental Sciences, Induction Program, Indian Constitution, Human Values and Professional Ethics	Non-credit	Non-credit
	Total	**160**	**160**

OPEN ELECTIVES offered by a Department SHOULD NOT be taken by the students of the same department

Open Elective I

S.No.	Course Title	Course Code
21	Global Warming and Climate Change (CE)	18CE2221/18CE3121/18CE3221
22	Industrial Safety and Hazards (EEE)	18EE2222/18EE3122/18EE3222
23	Nano Materials and Technology (ME)	18ME2223/18ME3123/18ME3223
24	Electronic Measuring Instruments (ECE)	18EC2224/18EC3124/18EC3224
25	JAVA Programming (CSE)	18CS2225/18CS3125/18CS3225
26	Intellectual Property Rights (MBA)	18MB2226/18MB3126/18MB3226

Open Elective II

S. No.	Course Title	Course Code
31	Building Technology (CE)	18CE3231/18CE4131
32	Energy Conservation and Management (EEE)	18EE3232/18EE4132
33	Digital Fabrication (ME)	18ME3233/18ME4133
34	Principles of Communication Systems (ECE)	18EC3234/18EC4134
35	Knowledge Management (CSE)	18CS3235/18CS4135
36	Supply Chain Management (MBA)	18MB3236/18MB4136

Open Elective III

S. No.	Course Title	Course Code
41	Disaster Management (CE)	18CE4241
42	Micro-electro-mechanical Systems (EEE)	18EE4242
43	Principles of Automobile Engineering (ME)	18ME4243
44	Biomedical Instrumentation (ECE)	18EC4244
45	Database Systems (CSE)	18CS4245
46	Entrepreneurship (MBA))	18MB4246

B.Tech (EEE)
I Year I Sem.
Detailed Syllabus

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EN1101- ENGLISH

B.Tech. EEE - I Year, I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None.

Course Objectives: Develop ability to

1. Improve the language proficiency in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Equip themselves to study the 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. Speak proficiently and listen effectively.

Course Outcomes: At the end of course, the student would be able to

CO1. Infer /use the vocabulary appropriately in any situation
CO2. Construct meaningful and explicit sentences in written form.
CO3. Acquire basic proficiency in English including reading comprehension and writing skills.
CO4. Communicate confidently in various contexts and different cultures
CO5. Comprehend the given text and respond appropriately.
CO6. Speak proficiently and listen effectively.

UNIT-I

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

Vocabulary Building: The Concept of Word Formation - The use of Prefixes and Suffixes, One-word Substitutes.

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 Clause 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 text book 'English for Engineers' Published by Cambridge University Press.

Vocabulary Building: Synonyms and Antonyms.

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, Letter of Complaint, Letter of Requisition, Job Application with Resume.

UNIT-III

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

Vocabulary Building: 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 -Abstract writing..

UNIT-IV

'What Should You Be Eating' from the prescribed text book 'English for Engineers' Published by Cambridge University Press.

Vocabulary Building: 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, Blog-Writing and Responding to a Blog, Essay Writing, and Précis Writing.

UNIT-V

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

Vocabulary Building: Technical Vocabulary and their usage.

Grammar: Active and Passive voice.

Reading: Reading Comprehension-Exercises for Practice.

Writing: Technical Reports-Introduction–Characteristics of Report– Categories of Reports- Formats-Structure of Reports (Manuscript Format)-Types of Reports- Writing a Report.

TEXT BOOK(S):

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

REFERENCE BOOKS:

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

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18PH1102 - APPLIED PHYSICS

B.Tech. EEE - I Year, I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None

Course Objectives: Develop ability to

1. Understand the concept of matter waves and application of Schrodinger wave equation.
2. Discuss the formation of energy bands in solids, classification of solids.
3. Understand the concept of Fermi level in intrinsic and extrinsic semiconductors and Hall Effect
4. Understand the concepts of light amplification, working of various types of lasers, optical fibers and their applications.
5. Understand different types of dielectric polarization mechanisms and classification of magnetic materials.

Course Outcomes: At the end of the course, student would be able to

CO1. Explain fundamental concepts on quantum behaviour of matter in its micro state.
CO2. Distinguish conductors, semiconductors and insulators.
CO3. Identify the type of extrinsic semiconductors through Hall Effect.
CO4. Explain phenomena of light amplification process, construction and working of different types of Lasers, Fiber optics and their applications in different fields.
CO5. Explain different types of dielectric polarization mechanisms, properties of different dielectric materials and their applications. Distinguish different types of magnetic materials.

UNIT-I

Quantum Mechanics: Introduction to quantum physics, Black body radiation, Planck's law (qualitative), Photoelectric 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

Introduction to theory of solids: Electron in a periodic potential-Bloch theorem, Kronig-Penney Model (Qualitative Treatment), Brillouin Zones (E-K curve), origin of energy band formation in solids, concept of effective mass of an electron, classification of materials into conductors, semiconductors and insulators.

UNIT-III

Semiconductors: Classification of semiconductors, n-type, p-type, carrier concentration in Intrinsic and Extrinsic Semiconductors, Fermi level in Intrinsic and Extrinsic Semiconductors, variation of Fermi level with temperature and concentration of dopants in extrinsic semiconductors, direct and indirect band gap semiconductors, Hall effect and its applications.

UNIT-IV

Lasers and Fiber Optics: Interaction of radiation with matter: Absorption, Spontaneous emission and Stimulated emission. Characteristics of Lasers, Resonating cavity, active medium, Pumping methods and

mechanisms, population inversion, Construction and working of Lasers: Nd:YAG Laser, He-Ne Laser, Carbon dioxide (CO_2) Laser, Applications of Lasers. Fiber Optics - Introduction, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index optical fibers, Losses associated with optical fibers, Applications of optical fibers.

UNIT-V

Dielectric and Magnetic Properties of Materials: Electric dipole, dipole moment, dielectric constant, polarizability, electric susceptibility, Displacement vector, electronic and ionic polarizations (Quantitative), orientation and space charge polarizations (qualitative). Internal fields in solids, Clausius - Mosotti equation, Ferroelectric, Piezoelectric and their applications. Origin of magnetic moment, Bohr magneton, classification of Dia, Para, Ferro, Antiferro and Ferri magnetic materials; domain theory of Ferro magnetism- Hysteresis curve, soft and hard magnetic materials and their applications.

TEXT BOOKS:

1. Physics, Halliday, Resnick and Krane, Wiley publishers, 5th edition, 2018.
2. Engineering Physics, B.K. Pandey, S. Chaturvedi – Cengage Learing.

REFERENCE BOOKS:

1. Semiconductor Optoelectronics: Physics and Technology, J. Singh, Mc Graw - Hill inc. 1995.
2. A Textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand publications, revised edition.
3. Online Course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Guptha on NPTEL.
4. Introduction to Solid State Physics, C Kittel, Wiley Publications, 8th edition.

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18MA1101 - MATHEMATICS-I

B.Tech. EEE - I Year, I Sem.

L	T	P/D	C
3	1	-/-	4

Prerequisite(s): None.

Course Objectives: Develop ability to

1. Understand various types of matrices, properties and rank of the matrix to find the solution for system of equations, if it exists.
2. Apply the knowledge of Eigen values and Eigen vectors of a matrix from quadratic form into a canonical form through linear and orthogonal transformations.
3. Identify the methods of solving the differential equations of first order and applications in engineering problems namely, Newton's law of cooling, Natural growth and decay.
4. Solve second and higher order differential equations of various types.
5. Analyze properties of Laplace Transform, Inverse Laplace Transform, convolution theorem and their applications to ordinary differential equations.

Course Outcomes: At the end of course, the student would be able to

CO1. Write the matrix representation of a set of linear equations and analyse solution of a system of equations.
CO2. Deduce Eigen values and eigenvectors of a matrix and apply the same to reduce quadratic form into a canonical form through linear and orthogonal transformations
CO3. Identify the type of differential equation and use the appropriate method to solve the same.
CO4. Apply higher order differential equations to solve engineering problems.
CO5. Solve Ordinary differential equations of second and higher order using Laplace Transform techniques.

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.

UNIT-II

Eigen values and Eigenvectors: 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

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-IV

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

UNIT-V

Laplace Transforms: Definition of Laplace transform, domain of the function and Kernel for the Laplace transforms. Existence of Laplace transforms. Laplace transform of standard functions, first shifting theorem, Laplace transform of functions when they are multiplied or divided by "t". Laplace transforms of derivatives and integrals of functions-Unit step function-second shifting theorem-Dirac's delta function, Periodic function-Inverse Laplace transform by Partial fractions (Heaviside method), Inverse Laplace transforms of functions when they are multiplied or divided by "s". Inverse Laplace transforms of derivatives and integrals of functions, Convolution theorem-Applications to ordinary differential equations.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th Edition, 2017.
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 10th Edition, 2011.

REFERENCE BOOKS:

1. A text book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi Publications.
2. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill, New Delhi.
3. Engineering Mathematics, Paras Ram, 2nd Edition, CBS Publishers.

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18CH1101– ENGINEERING CHEMISTRY

B. Tech. EEE - I Year, I Sem.

L	T	P/D	C
3	1	-/-	4

Prerequisite(s): None.

Course objectives: Develop ability to

1. Bring adaptability to the concepts of chemistry and to impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
2. Solve the problem of hardness and acquire the knowledge of various water treatment methods.
3. Acquire the knowledge of electrochemistry and corrosion which are essential for engineers to understand the problem of corrosion in industry.
4. Impart the knowledge of reaction mechanisms and synthetic aspects useful for understanding reaction pathways.
5. Acquire the knowledge on various spectroscopic techniques and apply them for medical and other fields.

Course Outcomes: At the end of the course, student would be able to

CO1. Explain atomic, molecular and electronic changes.
CO2. Explain hardness of water and its treatment methods.
CO3. Explain the principles and concepts of electrochemistry. Understand the problem of corrosion in industry.
CO4. Explain various reaction mechanisms and apply them in synthesis of organic compounds.
CO5. Apply required skills of various spectroscopic techniques in medical and other fields.

UNIT – I

Molecular 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 and F_2 molecules. Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral and Octahedral geometries. Crystal Field Stabilization Energies (CFSE). Applications of CFT- Magnetic Properties of the Octahedral and Tetrahedral Complexes.

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 corrosion: 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. Potentiometric titrations. Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery).

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 – methods of application. Electroless plating of Nickel.

UNIT – IV

Reaction Mechanisms and molecules of industrial importance: Substitution reactions: Nucleophilic substitution reactions: Mechanism of S_N1, S_N2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff's and anti Markownikoff'sadditions. Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule. Oxidation reactions: Oxidation of alcohols using $KMnO_4$ and chromic acid.

Reduction reactions: reduction of carbonyl compounds using $LiAlH_4$ & $NaBH_4$. Hydroboration of olefins. Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

Polymers: Classification of polymers, Types of Polymerization–addition and condensation, differences between addition and condensation polymers, Mechanism of free radical addition polymerization. Preparation, properties and engineering applications of PVC, Teflon and Nylon- 6, 6.

UNIT – V

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.

TEXT BOOKS:

1. Text book of Engineering Chemistry by Dr.A.Jayashree, Wiley publication, New-Delhi, 2018.
2. Engineering Chemistry by Dr. Thirumala Chary and Dr. E. Laxminarayana, Scitech publications, 2018.

REFERENCE BOOKS:

1. Selected topics in Inorganic Chemistry by Wahid U. Malik, G.D. Tuli and R.D Madan. S.Chand publications, 17th Edition.
2. Elements of Physical Chemistry, by P.W. Atkins 4th Edition.
3. Fundamentals of Molecular Spectroscopy, by C.N. Ban well, 4th Edition.
4. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E. Schore, 5th Edition.

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18CS1101- PROGRAMMING FOR PROBLEM SOLVING

B.Tech. EEE - I Year, I Sem.

L	T	P/D	C
2	-	-/-	2

Pre-requisite(s): None.

Course Objectives: Develop ability to

1. Solve problems by developing algorithms to solve problems using Raptor tool.
2. Understand the concepts of variables, constants, basic data types and input and output statement in a C programming language.
3. Understand the use of sequential, selection and repetition control statements into the algorithms implemented using C programming language.
4. Understand of structured design by implementing programs with functions and passing of parameters to solve more complex problems.
5. Understand the concepts related to arrays, strings and pointers and also with dynamic memory allocation in the context of C programming language.

Course Outcomes: After completion of the course, student would be able to

CO1. Demonstrate problem solving skills by developing algorithms to solve problems using Raptor tool.
CO2. Incorporate the concept of variables, constants, basic data types and input and output statement in a C language program.
CO3. Incorporate the use of sequential, selection and repetition control statements into the algorithms implemented as computer programs using C language.
CO4. Demonstrate an understanding of structured design by implementing programs with functions and passing of parameters to solve more complex problems.
CO5. Write C programs using arrays, strings and pointers and also with dynamic memory allocation.

UNIT – I

Basics of Computers

Logic Building: Flow chart, Algorithm, Pseudo code. Introduction to Raptor Programming Tool

Introduction to Programming – Computer Languages, Creating and running programs, Program Development.

Introduction to the C Language – Background, C Programs, Identifiers, Data Types, Variables, Constants, Input/output functions.

Operators - Arithmetic, relational, logical, bitwise, conditional, increment/decrement, assignment etc.., C program examples. Expressions, Precedence and Associativity, Expression Evaluation, Type conversions.

UNIT – II

Statements

Selection Statements (decision making) – if and switch statements with Raptor Tool, and C program examples.

Repetition statements (loops) - while, for, do-while statements with Raptor Tool, and C Program examples

Statements related to looping – break, continue, goto, Simple C Program examples.

UNIT - III

Functions-Designing Structured Programs, Functions, user defined functions, inter function communication, Standard functions, Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, C program examples.

Recursion- recursive functions, Limitations of recursion, example C programs

UNIT -IV

Arrays – Concepts, using arrays in C, arrays and functions, array applications, two – dimensional arrays, multidimensional arrays, C program examples.

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

UNIT - V

Pointers – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, void pointer, null pointer.

Pointer Applications - Arrays and Pointers, Pointer Arithmetic and arrays, passing an array to a function.

Memory allocation functions – malloc(), calloc(), realloc(), free().

Array of pointers, pointers to functions, C program examples.

TEXT BOOK(S)

1. Computer Science: A Structured Programming Approach Using C, B.A. Forouzan and R.F. Gilberg, Third Edition, Thompson Learning, 2007 Reprint.

REFERENCE BOOK(S)

1. Schaum's Outline of Programming with C, Byron Gottfried, McGraw-Hill.
2. Raptor-A flow charting Tool http://raptor.martincarlisle.com
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI.
4. Programming in C. P. Dey and M Ghosh , Oxford University Press.
5. Programming with C, B.Gottfried, 3rd edition, Schaum's outlines, TMH.
6. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, 7th Edition, Pearson education.

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18EN11L1- ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

B.Tech. EEE - I Year, I Sem.

L	T	P/D	C
-	-	3/-	1.5

Prerequisite(s): None.

Course Objectives: Develop ability to

1. Facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. Sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm.
3. Bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
4. Improve the fluency of students in spoken English and neutralize their Mother Tongue Influence.
5. Train students to use language appropriately for public speaking and interviews.

Course Outcomes: At the end of course, the student would be able to

CO1. Listen actively, speak fluently and write accurately.
CO2. Speak with clarity and confidence reducing MTI and enhance Employability skills.
CO3. Demonstrate better understanding of nuances of English Language.
CO4. Communicate intelligibly at work place.
CO5. Perform effectively in Interviews.
CO6. Plan and present ideas explicitly.

English Language and Communication Skills Lab (ELCS) shall have two parts:
a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

Module-I CALL Lab:
Understand: Listening Skill-Its importance–Purpose-Process-Types-Barriers to 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– making request and seeking permission. Introducing oneself and others.

Module-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: Telephone Etiquette. Descriptions- Places, Objects, Events and Process.

Module-III CALL Lab:
Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI), Examples from different parts of the country.
Practice: Common Indian Variants in Pronunciation–Differences in British and American Pronunciation.

ICS Lab:
Understand: How to make Formal Presentations.
Practice: Formal Presentations.

Module-IV CALL Lab:
Understand: Listening for General Details (2 practice exercises).
Practice: Listening Comprehension Tests (2 practice exercises).

ICS Lab:
Understand: Public Speaking-Debate– Exposure to Structured Talks (2 practice exercises).
Practice: Making a Short Speech– Extempore. (2 practice exercises)

Module-V CALL Lab:
Understand: Listening for Specific Details.(2 practice exercises)
Practice: Listening Comprehension Tests.(2 practice exercises)

ICS Lab:
Understand: General Interview Skills. Practice: Mock Interview Skills.

TEXT BOOKS:

1. Speaking English Effectively 2nd Edition by Krishna Mohan & N. P Singh, Mac Millan Publishers, 2011.
2. ELCS Lab Manual by Faculty, Department of English, GCET.

REFERENCE BOOKS:

1. How to Prepare for Interviews by Shashi Kumar. V & Dhamija P. V.
2. English Pronunciation in Use, Hancock. M , Cambridge University Press.
3. English Language Communication Skills Lab Manual Cum Workbook by Cengage Learning India, 2013.
4. Creative Writing Skills by Ashraf Rizvi.

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18CH11L1 - ENGINEERING CHEMISTRY LAB

B. Tech. EEE - I Year, I Sem.

L	T	P/D	C
-	-	3/-	1.5

Prerequisite(s): None.

Course objectives: Develop ability to

1. Estimate the hardness content in water to check its suitability for drinking purpose.
2. Use instrumental methods namely, Potentiometry and Conductometry to find the concentration of a given solution.
3. Measure physical properties like surface tension, adsorption and viscosity.
4. Know the synthesis of most effective drug molecules.
5. Determine the rate constant of reactions from concentrations as a function of time.

Course Outcomes: At the end of the course, student would be able to

CO1. Determine parameters like hardness content in water.
CO2. Use instrumental methods like Potentiometry and Conductometry.
CO3. Determine physical properties like surface tension, adsorption, acid value and viscosity.
CO4. Use techniques which are fundamental in the synthesis of Aspirin, Paracetamol etc.
CO5. Estimate rate constant of a reaction from concentration – time relationships.

LIST OF EXPERIMENTS:

I. Titrimetry

1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of acid value of coconut oil.

II Instrumental Methods

A. Potentiometry

3. Estimation of HCl by Potentiometric titrations
4. Estimation of Fe^{2+} by Potentiometry using $KMnO_4$

B. Conductometry

5. Estimation of an HCl by Conductometric titrations
6. Estimation of Acetic acid by Conductometric titrations

III. Physical Constants

7. Determination of viscosity of a given liquid by using Ostwald's viscometer.
8. Determination of surface tension of a given liquid using stalagmometer.

IV. Synthesis

9. Synthesis of Aspirin and Paracetamol.

V. Kinetics

10. Determination of rate constant of acid catalysed hydrolysis of methyl acetate

VI. Additional Experiments

11. Verification of Freundlich adsorption isotherm-adsorption of acetic acid on charcoal
12. Determination of partition coefficient of acetic acid between n-butanol and water.

REFERENCE BOOKS:

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

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18CS11L1 - PROGRAMMING FOR PROBLEM SOLVING LAB

B.Tech. EEE - I Year, I Sem.

L	T	P/D	C
-	-	2/-	1

Pre-requisite(s): None.

Course Outcomes: Develop ability to

1. Solve problems by developing algorithms to solve problems using Raptor tool.
2. Understand the concepts of variables, constants, basic data types and input and output statement in a C programming language.
3. Understand the use of sequential, selection and repetition control statements into the algorithms implemented using C programming language.
4. Understand of structured design by implementing programs with functions and passing of parameters to solve more complex problems.
5. Understand the concepts related to arrays, strings and pointers and also with dynamic memory allocation in the context of C programming language.

Course Outcomes: After completion of the course, student would be able to

CO1. Demonstrate problem solving skills by developing algorithms to solve problems using Raptor tool.
CO2. Incorporate the concept of variables, constants, basic data types and input and output statement in a C language program.
CO3. Incorporate the use of sequential, selection and repetition control statements into the algorithms implemented as computer programs using C language.
CO4. Demonstrate an understanding of structured design by implementing programs with functions and passing of parameters to solve more complex problems.
CO5. Write C programs using arrays, strings and pointers and also with dynamic memory allocation.

LIST OF EXPERIMENTS:

1 Introduction to RAPTOR Tool
Draw Flow chart using RAPTOR for,
Read a number and Display the same number
Read and Display the student details
Read two numbers from user and calculate addition and subtraction of those numbers
Read two numbers from user at the time of execution and calculate multiplication and division of those numbers
Find the square of a given number (take the number from the user)
Calculate the value of Y from the equation y = x2 + 2x + 3 (read the value of X from user)

2 Draw Flow chart using RAPTOR for,
Calculate the area of a Circle
Calculate the area of a Square
Calculate the area of a Rectangle
Interchange two numbers

Find the sum of square of two numbers
Convert Centigrade to Fahrenheit
Convert Radius to Degrees
Display the roots of Quadratic Equation

3 Draw Flow chart using RAPTOR for,
Check the given number is Positive or Negative
Check the given number is even or odd
Display whether a person is eligible for vote or not
Calculate the Largest of two numbers
Check the given year is leap year or not
Check whether two numbers are equal or not
Find the largest value among three given numbers

4 Draw Flow chart using RAPTOR for,
Calculate and display the grade of a student
< 30 % - Fail
Between 31 and 50 – C grade
Between 51 to 60 – B grade
Between 61 to 75 – A grade
Greater than 75 - distinction
Find the quadratic roots of an equation (real or imaginary)
Check the given number is multiple of 2, 4 and 8

5 Draw Flow chart using RAPTOR for,
Display n numbers using looping
Calculate the sum of n natural numbers
Display the even numbers below n
Calculate sum of even numbers and odd numbers from 1 to n (n value supplied by the user)

6 Write a C program to display student details
Write a C program to perform arithmetic operations
Write a C program to implement increment and decrement operators
Write a C program to implement conditional operator
Write a C program to implement bit wise operator

7 Write a C program to calculate the biggest of given two numbers
Write a C Program to print the result depending on the following
< 30 % - Fail
Between 31 and 50 – C grade
Between 51 to 60 – B grade
Between 61 to 75 – A grade
Write a C Program to implement arithmetic calculator using switch case

8 Write a C program to find sum of n natural numbers
Write a C program to find individual digits of the given number
Write a C program to find factorial of a given number

9 Write a C program to display the prime numbers below n (where n value is given by user)
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.
Write a C program to find the quadratic roots of an equations
Write a c program to calculate sum of the following geometric equation
Sum=1+x+x2 +x3+….. + xn

10 Write a C program to find the given number is palindrome or not
Write a C program to find GCD and LCM of two given numbers using functions
Write a C program to find the factorial of a given number using recursive function
Write a C program to generate the fibonacci series using recursive function

11 Write a c program to find largest and smallest numbers in a list of array elements using functions
Write a C program to sort the given list of elements in ascending order using functions.
Write a c program to search for a given element in the list of array and display the "location" if the number is found else print "the number is not found".
Using fixed length array
Using variable length array.

12 Find the duplicate elements in the list of sorted array
Write a C program that uses functions to perform the Addition of Two Matrices
Write a C program that uses functions to perform the Multiplication of Two Matrices

13 Write a C program to find weather a given string is palindrome or not.
Write a C program to insert characters at a given location in a given string.
Write a C program to delete characters from a given string and position
Write a C program to print the number of vowels and consonants using Strings.

14 Write a C program to convert Roman number to Decimal Number.
Write a C program to find the 2's Compliment of a given string
Write a C program to Reverse a String by Passing it to function
C Program to Input a String with at least one Number, Print the Square of all the Numbers in a String

15 Write a C program to swap two integers using following methods
call by value
call by reference
Write a C program to find sum of even and odd numbers using functions and pointers

16 Write a C program to find Largest Number Using Dynamic Memory Allocation.
Write a C program to return multiples values from a function using pointers

B.Tech (EEE)
I Year II Sem
Detailed Syllabus

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18PH1201 - SEMICONDUCTOR DEVICES

B.Tech. EEE - I Year, II Sem.

L	T	P/D	C
3	-	-/-	3

Pre-requisite(s): 18PH1102 - Applied Physics

Course objectives: Develop ability to

1. Analyze p-n junction diode and its characteristics; understand breakdown mechanisms in semiconductor diodes and operation of photo and varactor diodes.
2. Understand the working of optoelectronic materials and devices
3. Understand the functioning of rectifiers and filters; working of Zener diode as a voltage regulating device.
4. Understand the operation of BJT, its various configurations and applications.
5. Discuss various methods of transistor biasing, understand the basic concepts of BJT and JFET.

Course outcomes: At the end of the course, student would be able to

CO1. Explain V-I characteristics of p-n junction diode, photo diode and varactor diode.
CO2. Analyze the working of various optoelectronic devices.
CO3. Explain working of half wave and full wave rectifiers, filters and their applications.
CO4. Explain the functioning of BJT, distinguish various configurations of BJT and their applications.
CO5. Analyze various transistor biasing methods and functioning of FET, summarize the differences between BJT and FET.

UNIT I

P-N junction diode: Qualitative theory of p-n junction, Energy level diagram of p-n junction in forward and reverse bias condition, p-n junction as a diode, volt-ampere characteristics, temperature dependence of V-I characteristic, Transition and Diffusion capacitances (qualitative),breakdown mechanisms in semiconductor diodes, Zener diode characteristics, Photo diode, Varactor diode characteristics.

UNIT II

Optoelectronics: Radiative and non-radiative recombination mechanisms in semiconductors, LED and semiconductor lasers: Device structure, Materials, Characteristics and figures of merit, Semiconductor photodetectors: Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics.

UNIT III

Rectifiers and Filters: p-n junction as a rectifier, half wave rectifier, full wave rectifier, bridge rectifier, harmonic components in a rectifier circuit, inductor filters, capacitor filters, L- section filters, π- Section filters, comparison of filters, voltage regulation using Zener diode.

UNIT IV

Bipolar Junction Transistor: Junction transistor, BJT symbol, transistor construction, BJT operation, common base, common emitter and common collector configurations. Transistor current components, limits of operation, transistor as an amplifier, comparison of CB, CE, CC amplifier configurations.

UNIT V

Transistor biasing-stabilization and Field Effect Transistor: The DC and AC load lines, Operating point, need for biasing , fixed bias, collector feedback bias, Emitter feedback bias, Collector-Emitter feedback bias, Voltage divider bias - bias stability and stabilization factors, stabilization against variations in V_{BE} and β.

Field Effect Transistor: The Junction field effect Transistor (Construction, Principle of operation, symbol) Pinch – off voltage, V-I characteristics, The JFET small signal model, comparison of BJT and FET (Qualitative treatment).

TEXT BOOKS:

1. Electronic Devices & Circuits, Millman's Halkias, Mc Graw Hill Book Publishers, 4th edition, 2017.
2. Engineering Physics, H.K. Malik, A. K. Singh, Tata Mc Graw Hill Book Publishers, 2nd edition, 2017.

REFERENCE BOOKS:

1. Electronic devices & Circuits, S Salivahanan, N Srushkumar, A Vallava Raj, Tata Mc Graw Hill Book Publishers, 2nd edition.
2. Fundamentals of Physics, Halliday Resnick and Krane, John Weily Publishers, 5th edition.
3. Online course: "Optoelectronic materials and devices" by Monica Katiyar and Deepak Gupta on NPTEL.

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18MA1201 - MATHEMATICS-II

B.Tech. EEE - I Year, II Sem.

L	T	P/D	C
3	1	-/-	4

Prerequisite(s): 18MA1101 - Mathematics - I

Course Objectives: Develop ability to

1. Understand Geometrical approach to the mean value theorems, their application to the mathematical problems and evaluate improper integrals using Beta and Gamma functions.
2. Identify the methods of differential calculus to optimize single and multivariable functions.
3. Evaluate multiple integrals and apply the same to solve engineering problems.
4. Explain properties of vector operators. Use vector calculus to determine the length of a curve, area between the surfaces and volume of solids.
5. Apply partial differential equations to solve problems in one dimensional heat and wave equations.

Course Outcomes: At the end of course, the student would be able to

CO1. Apply mean value theorem on mathematical problems, evaluate improper integrals, surface areas and volumes of revolutions of curves.
CO2. Apply the methods of differential calculus to optimize single and multivariable functions.
CO3. Evaluate multiple integrals and apply the concepts of same to find the areas and volumes.
CO4. Apply vector operators on scalar and vector point functions to compute length of a curve, area between the surfaces and volume of solids, using vector calculus.
CO5. Apply partial differential equations to solve problems like one dimensional wave equation and one dimensional heat equation that arise in engineering branches.

UNIT-I

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

UNIT-II

Multivariable calculus (Partial Differentiation and applications): Definitions of Limit and continuity: Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence and 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 to polar coordinates) triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

UNIT-IV

Vector Calculus: 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.

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

UNIT-V

Partial Differential Equations: Introduction and Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation, Method of separation of variables for second order equations –Applications of Partial differential equations- one dimensional wave equation, and one dimensional Heat equation.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th Edition, 2017.
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 10th Edition, 2011.

REFERENCE BOOKS:

1. A text book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi Publications.
2. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill, New Delhi.
3. Engineering Mathematics, Paras Ram, 2nd Edition, CBS Publishers.

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18MA1202 - COMPUTATIONAL MATHEMATICS

B.Tech. EEE - I Year, II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18MA1101-Mathematics - I

Course Objectives: Develop ability to

1. To approximate a polynomial/curve to satisfy the given set of data.
2. To evaluate differentiation/integration for a given set of data using numerical techniques.
3. To compute approximate zeros of an algebraic/transcendental / system of equations using suitable numerical methods.
4. Apply various numerical techniques to compute approximate solution of a given Ordinary Differential Equation (ODE) with initial condition.
5. To apply the different methods to fit a curve for the set of data using method of least squares.

Course Outcomes: At the end of course, the student would be able to

CO1. Estimate a polynomial/curve to satisfy the given set of data.
CO2. Apply various numerical techniques to evaluate differentiation/integration for a given set of data.
CO3. Apply suitable numerical methods to find the approximate root / solution of algebraic / transcendental equations.
CO4. Solve a given Ordinary Differential Equation (ODE) with the initial condition using suitable numerical techniques.
CO5. Estimate a curve for the set of data using method of least squares arise in engineering branches.

UNIT – I

Interpolation: Introduction-Errors in polynomial Interpolation - Finite Differences - Forward Differences - Backward Differences - Central Differences - Symbolic relations and separation of symbols – Difference equation - Differences of a polynomial - Newton's formulae for interpolation - interpolation with unevenly spaced points - Lagrange's interpolation formula.

UNIT – II

Numerical Differentiation, Integration: Numerical differentiation: Newton's forward and backward difference derivatives, Numerical integration – General quadrature formula, Trapezoidal rule, Simpson's 1/ *3rd*and *3/8th* Rule.

UNIT – III

Root Finding Methods and Solution of System of Equations: Solution of Algebraic and Transcendental Equations and Linear system of equations, Introduction – Graphical interpretation of solution of equations, The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method, Solving system of non-homogeneous equations by L-U Decomposition method (Crout's Method), Jacobi's and Gauss Seidel Iteration method.

UNIT – IV

Numerical Solutions of First Order Differential Equations: Numerical solution of Ordinary Differential equations: Solution by Taylor's series method –Picard's method of successive Approximation- single step methods-Euler's method-Euler's modified method, Runge - Kutta fourth order method.

UNIT-V

Curve Fitting: Fitting of a straight line - Second degree curve –exponential curve -power curve by method of least squares.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 44th Edition, 2017.
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 10th Edition, 2011.

REFERENCE BOOKS:

1. Introductory methods of Numerical Analysis by S.S. Sastry, PHI learning.
2. Advanced Engineering Mathematics, Michael Greenberg, Second Edition. Pearson Education.
3. A text book of Higher Engineering Mathematics, Bali N P and Manish Goyal, Lakshmi Publications.

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18CS1201-DATA STRUCTURES

B.Tech. EEE - I Year, II Sem.

L	T	P/D	C
2	-	-/-	2

Prerequisite(s): 18CS1101-Programming for Problem Solving

Course Objectives: Develop ability to

1. Introduce the structure, union, and enumerated types
2. Introduce to linear lists, implementation using arrays and linked list.
3. Understand the classical approaches to sorting arrays: selection sort, bubble sort, insertion sort; sequential and binary searching algorithms.
4. Concepts and principles of stacks and queues and their applications.
5. Understand the basic characteristics of text, binary files and C implementation of file I/O using streams. Introduction to Non-linear data structures.

Course Outcomes: After completion of the course, student would be able to

CO1. Use the type definition, enumerated types, define and use structures, unions in programs using C language.
CO2. Understand the time and space complexity. Ability to implement linear lists.
CO3. Write programs that sort data using selection, bubble, insertion sort techniques and perform search mechanisms either by sequential or binary search techniques using C language program.
CO4. Demonstrate the basic operations of stacks and queues using C program.
CO5. Write programs that read and write text, binary files using the formatting and character I/O functions. Define basic non-linear list terminologies.

UNIT – I

Enumerated – The Type Definition (typedef), Enumerated types

Structure and Union Types – Declaration, initialization, accessing structures, operations on structures, Complex structures, Structures and functions, passing structures through pointers, self referential structures, unions, bit fields.

Command line arguments, Preprocessor commands.

UNIT – II

Basic concept of order of complexity through the example programs

Linear list - Singly linked list implementation, insertion, deletion and searching operations on linear list

UNIT - III

Sorting - Selection sort, bubble sort, insertion sort techniques (Using Arrays)

Searching - Linear search, binary search techniques (Using Arrays)

UNIT – IV

Stacks – Introduction, Principle, Operations: Push and Pop, In-fix to Post-Fix Conversion and Post-Fix evaluation. (Array implementation.)

Queues - Introduction, Principle, Operations: Enqueue and Dequeue. (Array implementation.)

UNIT – V

File Input and Output – Concept of a file, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), file status functions (error handling), Positioning functions.

Program Development – Multi-source files, Separate Compilation of functions

Basic Non-Linear Data Structures: Introduction, Definition and terminology of Trees, Graphs.

TEXT BOOK(S):

1. B.A. Forouzan and R.F. Gilberg, Computer Science: A Structured Programming Approach Using C, Thompson Learning, 3rd Edition, 2007 Reprint.

REFERENCE BOOKS:

1. Schaum's Outline of Programming with C, Byron Gottfried, McGraw-Hill.
2. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI.
3. Programming in C. P. Dey and M Ghosh , Oxford University Press.
4. Programming with C, B.Gottfried, 3rd edition, Schaum's outlines, TMH.
5. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, 7th Edition, Pearson education.
6. C & Data structures – P. Padmanabham, 3rd Edition, B.S. Publications.

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18ME1201 - ENGINEERING GRAPHICS

B Tech. EEE - I Year, II Sem.

L	T	P/D	C
1	-	4/-	3

Pre-requisite(s): **None.**

Course objectives: Develop ability to

1. Understand basic concepts in engineering drawing.
2. Understand the principle of orthographic projection and isometric projection for planes and solids.
3. Draw sectional views and development of surfaces.
4. Draw isometric views and pictorial views of solids.
5. Learn basic concepts and commands in AutoCAD.

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

CO1. Draw various curves and scales in engineering drawing practice.
CO2. Draw orthographic projections of points, lines and planes.
CO3. Draw orthographic projections of solids and sections.
CO4. Draw Isometric Views to Orthographic Views and Vice-versa and development of surfaces of objects.
CO5. Apply basic AutoCAD commands for engineered drawings.

UNIT – I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales – Plain and Diagonal.

UNIT – II

Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.

UNIT – III

Projections of Solids: Projections of Regular Solids, Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone, Sphere.

UNIT – IV

Development of Surfaces of Right Regular Solids: Prism, Cylinder, Pyramid and Cone.

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

UNIT – V

Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions

Introduction to CAD: (For Internal Evaluation Weightage only):

Introduction to CAD Software Package Commands. - Free Hand Sketches of 2D- Creation of 2D Sketches by CAD Package.

TEXT BOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar,53rd Edition, 2016.
2. Engineering Drawing / Basant Agrawal and McAgrawal/ McGrawHill, 2nd Edition, 2013.

REFERENCE BOOKS:

1. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford, 1st Edition, 2015.
2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson, 2nd Edition, 2013
3. Computer Aided Engineering Drawing – K Balaveera Reddy, CBS Publishers, 2nd Edition, 2015.

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18PH12L1- SEMICONDUCTOR DEVICES LAB

B.Tech. EEE - I Year, II Sem.

L	T	P/D	C
-	-	3/-	1.5

Pre-requisite(s): 18PH1102 - Applied Physics

Course Objectives: Develop ability to

1. Determine magnetic induction at several points on the axis of coil carrying current and the wavelength of LASER.
2. Determine time constant of a RC circuit, energy gap of a given semiconductor, Hall coefficient, work function of a given material and resonant frequency of LCR circuit.
3. Plot V-I characteristics of LED, p-n junction and Zener diode, understand rectification process and working of rectifier, understand the conversion of light into electrical energy.
4. Plot the characteristics of transistor in different configurations.
5. Plot drain and transfer characteristics of a Field Effect Transistor (FET).

Course Outcomes: After completion of the course, student would be able to

CO1. Summarize working principle of electromagnetic induction and compute the wavelength of a laser.
CO2. Compute time constant of RC circuit, energy gap of semiconductor, identify type of semiconductor, compute work function of a given material and resonant frequency of LCR circuit.
CO3. Demonstrate the V-I characteristics of LED, p-n junction diode, the application of Zener diode as voltage regulator and conversion of AC to DC with and without filters, exhibits knowledge in developing various applications of solar cells.
CO4. Evaluate current gain of a given n-p-n transistor.
CO5. Analyze the drain and transfer characteristics of FET in common source configuration.

Any ten of the following fourteen experiments are mandatory to perform by each student

1. Draw the V-I characteristics of LED.
2. Determination of the wavelength of a given source of LASER-Diffraction grating.
3. Determination of time constant of a given RC combination.
4. Determination of energy gap of a given semiconductor.
5. V-I Characteristics of p - n junction diode and Zener diode.
6. Input and Output characteristics of n-p-n transistor - CE and CB configurations.
7. Conversion of ac to dc by using half wave rectifier with and without filters.
8. Conversion of ac to dc by using full wave rectifier with and without filters.
9. FET characteristics.
10. V-I characteristics of a Solar cell.
11. Determination of resonant frequency and quality factor of series LCR circuit.
12. Hall Effect: To determine Hall coefficient of a given semiconductor.
13. Photo electric effect: To determine work function of a given material.
14. Stewart-Gee's experiment. Determination of magnetic field along the axis of a current carrying coil.

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18MA12L1 - COMPUTATIONAL MATHEMATICS LAB

B.Tech. EEE - I Year, II Sem.

L	T	P/D	C
0	0	2/-	1

Prerequisite(s): 18CS1101 - Programming for Problem Solving

Course Objectives: Develop ability to

1. Estimating the value of a function for any intermediate value of the independent variable.
2. Evaluate the solution of definite integrals for a given set of data using numerical integration methods.
3. Obtain the solution of a system of non-homogeneous equations using different methods: L-U decomposition and Gauss-seidel method.
4. To compute approximate zeros of an algebraic/transcendental equations using Bisection method.
5. Solve first order ordinary differential equations using numerical techniques.

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

CO1. Determine the values of y corresponding to any value of $x = x_i$ between x_0 and x_n.
CO2. Apply Numerical integration techniques to find approximate area.
CO3. Determine the solution of system of non-homogeneous equations using various methods.
CO4. Apply suitable numerical methods to find the approximate root / solution of algebraic / transcendental equations.
CO5. Find the numerical solutions for a given first order initial value problem using various methods.

S No. LIST OF EXPERIMENTS:

1. Program to determine y for a given x, if two arrays of x and y of same size are given (using Newton's forward interpolation method).
2. Program to determine y for a given x, if two arrays of x and y of same size are given (using Lagrange's interpolation).
3. Program to evaluate definite integral using trapezoidal rule, Simpson's $1/3^{rd}$ rule and $3/8^{th}$ rule.
4. Program to find the solution of given system of linear equations using L-U decomposition method.
5. Program to find the solution of given system of equations using Gauss-seidel iteration method.
6. Program to find the root of algebraic / transcendental equations by using Bisection method.
7. Program to solve a given differential equation using modified Euler's method.
8. Program to solve a given differential equation using Runge-Kutta fourth order method.

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18CS12L1-DATA STRUCTURES LAB

B.Tech. EEE - I Year, II Sem.

L	T	P/D	C
-	-	2/-	1

Pre-requisite(s): None.

Course Objectives: Develop ability to

1. Introduce the structure, union, and enumerated types
2. Introduce to linear lists, implementation using arrays and linked list.
3. Understand the classical approaches to sorting arrays: selection sort, bubble sort, insertion sort; sequential and binary searching algorithms.
4. Concepts and principles of stacks and queues and their applications.
5. Understand the basic characteristics of text, binary files and C implementation of file I/O using streams. Introduction to Non-linear data structures.

Course Outcomes: After completion of the course, student would be able to

CO1. Use the type definition, enumerated types, define and use structures, unions in programs using C language.
CO2. Understand the time and space complexity. Ability to implement linear lists.
CO3. Write programs that sort data using selection, bubble, insertion sort techniques and perform search mechanisms either by sequential or binary search techniques using C language program.
CO4. Demonstrate the basic operations of stacks and queues using C program.
CO5. Write programs that read and write text, binary files using the formatting and character I/O functions. Define basic non-linear list terminologies.

S No	NAME OF THE PROGRAM
1	Write a C program to implement complex structures for the following operations. i) Addition of two Complex numbers ii) Multiplication of two Complex Numbers
2	a) Write a C program to implement arrays of structures? b) Write a C program to implement bit fields in C?
3	a) Write a C Program to store the information (name, roll no, and branch) of a student using unions. b) Write a C program to implement inter function communication by passing pointers to a structure.
4	Write a C program to implement singly linked list for the following operations. a) Insertion b)Deletion c)Search
5	a) Write a C program to sort the elements using selection sort b) Write a C program to sort the elements using Bubble sort.
6	a) Write a C program to sort the elements using Insertion sort b) Write a C program to search an element in a list of elements using linear search. If the element found display the position, otherwise print “element not present”.
7	Write a C program to search an element in a list of elements using Binary search. If the

element found display the position, otherwise print "element not present".

8 Write a C program convert infix to postfix notation and postfix evaluation using stack.

9 Write a C program implement Queue using arrays for the following operations.

i) Enqueue ii) Dequeue iii) Peek iv) Display

10 Write a C program open a new file and implement the following I/O functions.

i) fprintf(), fscanf()
ii) getw(), putw()
iii) getc(), putc()

11 a) Write a C program to copy data from one file to another.

b) Write a C program to merge two files, using command line arguments.

12 Write a C program to implement multi file programming for basic arithmetic operations

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Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18ME12L1- ENGINEERING WORKSHOP

B.Tech. EEE - I Year, II Sem.

L	T	P/D	C
-	-	3/-	1.5

Prerequisite(s): None.

Objective: Develop ability to

1. Develop a right attitude, team working, precision and safety at work place.
2. Gain a good basic working knowledge required for the production of various engineering products.
3. Provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
4. Know the labour involved, required tools, machinery or equipment with necessary time required in actual working in different trades.
5. Identify and use of marking tools, hand tools, measuring equipment and to work with prescribed tolerances.

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

CO1. Recognize dignity of labour and workshop regulations.
CO2. Study and practice on hand, power tools and their operations.
CO3. Practice on manufacturing of components using workshop trades including plumbing, fitting, carpentry, foundry, and welding.
CO4. Identify and apply suitable tools for different trades of engineering processes including drilling, material removing, measuring, chiseling.
CO5. Perform various basic house wiring techniques.

A) Trades for Exercises:

At least two exercises from each trade:

a. **Carpentry**: T-lap joint, cross lap joint, mortise and tenon joint, Bridle joint, Corner lap joint.
b. **Fitting**: Square joint, V joint, half round joint, dovetail joint, L-Fitting.
c. **Tin-Smithy**: Tray, cylinder, hopper, funnel, Open scoop.
d. **Black Smithy**: Simple exercises such as upsetting, drawing down, punching, bending, swaging and fullering.
e. **House-wiring**: Wiring for two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.
f. **Foundry**: Preparation of sand mould using Single Piece pattern, Preparation of sand mould using Split pattern.
g. **Welding Practice**- Single butt joint, Corner Joint, T-filled Joint, Lap Joint.

B) Trades for Demonstration:

a. Plumbing
b. Machine Shop

TEXT BOOKS:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

REFERENCE BOOKS:

1. Engineering Workshop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd.
2. Workshop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapoovan, Saravana Pandian, Vikas publishers
4. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

B.Tech (EEE)
II Year I Sem
Detailed Syllabus

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18MA2101– COMPLEX VARIABLES

B.Tech EEE - II Year, I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18MA1201 - Mathematics-II

Course Objectives: Develop ability to

1. Understand difference between real and complex valued functions and verify its analyticity.
2. Appreciate integrations of complex valued functions.
3. Express complex valued functions in terms of power series and test its convergence using complex integral theorems.
4. Understand residues and apply residue theorem to compute several kinds of real definite integrals.
5. Transform a given complex valued function from Z-plane to W-Plane using conformal, standard and bilinear transformations.

Course Outcomes: At the end of the course, student would be able to:

CO1. Test analyticity of a given function using Cauchy-Riemann equations and find complex function for given real or imaginary parts.

CO2. Apply Cauchy's theorem, Cauchy's integral formula including Generalized to evaluate integration of complex valued functions.

CO3. Use Maclaurin's and Laurent series to expand given complex valued functions and test its convergence.

CO4. Compute several kinds of real definite integrals using residue theorem.

CO5. Employ conformal, standard and bilinear transformations to transform a given complex valued function from Z-plane to W-Plane.

UNIT-I

Complex Functions and Analyticity–Differentiation: Complex functions and its representation on Argand plane, Concepts of limit Continuity, Differentiability, Analyticity, Cauchy-Riemann conditions, Harmonic functions – Milne – Thompson method.

UNIT-II

Complex Integration: Line integral – Evaluation along a path and by indefinite integration – Cauchy's theorem – Cauchy's integral formula – Generalized Cauchy's integral formula.

UNIT-III

Power series expansions of complex functions: Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series, Singular point –Isolated singular point – pole of order m – essential singularity.

UNIT-IV

Contour Integration: Residue – Evaluation of residue by formula and by Laurent series. Residue theorem, Evaluation of integrals of the type (a) Improper real integrals $\int_{-\infty}^{\infty} f(x)dx$ $(b)\int_{c}^{c+2\pi} f(cos\theta, sin\theta)d\theta$ (c) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$ (d) Integrals by indentation.

UNIT-V

Conformal mapping: Transformation of z-plane to w-plane by a function, Conformal transformation. Standard transformations- Translation; Magnification and rotation; inversion and reflection, Transformations like e^z, log z, z^2 , and Bilinear transformation, Properties of Bilinear transformation, determination of bilinear transformation when mappings of three points are given.

TEXT BOOKS:

1. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers.
2. A Text Book of Engineering Mathematics by N P Bali, and Dr Manesh Goyal, Laxmi publications

REFERENCE BOOKS:

1. Complex analysis for Mathematics and Engineering by John H, Jones And Bartlett India Pvt Ltd. - New Delhi. 6th Edition
2. Foundations of Complex Analysis by S. Ponnuswamy, Narosa Publications
3. Advanced Engineering Mathematics, H.K.Dass, S.Chand publishers
4. Engineering Mathematics by Srimanta pal, subhodh C.Bhunia, Oxford higher Education.

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Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18ME2103 - FLUID MECHANICS AND HYDRAULIC MACHINERY

B.Tech EEE - II Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): **None**

Course Objectives: Develop ability to

1. Understand the fundamental fluid properties , understand basic concepts of conservation of mass, energy and momentum equations and application to simple problems.
2. Understand working principles of pressure, velocity and discharge measuring devices and momentum principles.
3. Understand concept of basic boundary layer theory and basic principles of turbo machinery.
4. Understand working of various turbines such as Pelton wheel, Francis and Kaplan turbines.
5. Understand working of centrifugal and reciprocating pumps.

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Explain fluid properties, types of fluid flows and formulate one and three dimensional compressible fluid flow problems and solve the same.

CO2. Apply conservation of mass, energy and momentum laws to fluid flow problems in engineering applications and study the losses in pipes.

CO3. Compute drag and lift forces using theory of boundary layer and understand the basics of turbo machinery.

CO4. Analyze practical problems of various turbines used in Industry and hydro power plants.

CO5. Solve various engineering problems related to centrifugal and reciprocating pumps used in agriculture, domestic and industrial applications.

UNIT-I

Fluid statics and Fluid Kinematics: Dimensions and units: Concept of continuum physical properties of fluids- specific gravity, viscosity surface tension- vapour pressure and their influence on fluid motion Pascal's –law ,hydrostatic law , atmospheric, gauge and vacuum pressure –measurement of pressure- Piezometer, U-tube and differential manometers, Mechanical guages. Stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows. Equation of continuity for one and three dimensional flow.

UNIT-II

Fluid dynamics and Closed conduit flow: Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend. Measurement of flow: Pitot tube, venturi meter, orifice meter and Flow nozzle. Viscous Flow**,** Reynolds's experiment- Darcy-Weisbach equation-minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line.

UNIT-III

Boundary layer concepts and Basics of turbo machinery: Viscous and Potential flow, Definition and thickness, laminar and turbulent boundary layers (no derivation) ,separation of boundary layer submerged objects –drag and lift. Hydro dynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

UNIT-IV

Hydraulic Turbines and Performance of hydraulic turbines: Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design. Draft tube theory functions and efficiency. Specific speed of turbine, Geometric similarity, Unit and specific quantities, characteristic Curves, governing of turbines, selection of type of turbine, cavitations, surge tank. Water hammer

UNIT-V

Centrifugal pumps and Reciprocating pumps: Classification, working, work done – barometric head - losses and efficiencies specific speed - pumps in series and parallel - performance characteristic curves, Priming, NPSH. Working of reciprocating pumps, discharge, slip, indicator diagrams.

TEXT BOOKS:

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH, Standard book house. Delhi 1991, volume 1.
2. Frank M. White, Fluid Mechanics, McGraw Hill

REFERENCE BOOKS:

1. Fluid Mechanics and Hydraulic Machines by Rajput, s. chand & company ltd. Delhi. 2008.
2. Fluid Mechanics & fluid power engineering by D.S. Kumar, S.K. Katiraia & Sons publications
3. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.
4. Fluid Mechanics and Machinery by Cengel & Cibala, New Age International.
5. Hydraulic Machines by Banga & Sharma, Khanna Publishers.
6. Fluid Mechanics and Hydraulic Machines by Bansal, Lakshmi publications.

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EC2102 – DIGITAL DESIGN

B.Tech EEE - II Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None

Course Objectives: Develop ability to

1. Understand basic concepts of various number systems used in digital systems.
2. Understand Boolean algebra and various Boolean simplification theorems.
3. Understand simplification of Boolean functions using k-map and tabular method.
4. Understand design and analysis of combinational and sequential logic circuits.
5. Understand symmetric functions and design the same using relay contacts.
6. Understand Threshold logic and design switching functions using threshold elements.

Course Outcomes: At the end of the course, student would be able to

CO 1. Perform conversions from one number system to another.
CO 2. Simplify switching functions using Boolean minimization theorems, map method and tabulation method.
CO 3. Analyze and design combinational logic circuits and the effect of Static Hazards on these circuits.
CO 4. Synthesize symmetric functions using relay contact networks.
CO 5. Design switching circuits using threshold elements.
CO 6. Analyze and Design Sequential logic Circuits.

UNIT-I

Number Systems and Boolean algebra and Switching Functions: Number Systems, Base Conversion Methods, Binary arithmetic, Complements of Numbers, Codes-Binary Codes, Binary Coded Decimal (BCD) Code and its Properties, Unit Distance Codes, Alpha Numeric Codes, Error Detecting and Correcting Codes. Switching algebra, Basic Gates, Basic Theorems and Properties, Switching Functions, Canonical and Standard Form, Algebraic Simplification of Digital Logic Gates. Properties of XOR Gates, Universal Gates, Multilevel NAND/NOR realizations.

UNIT-II

Minimization of switching functions: Introduction, Minimization with theorems, The Karnaugh Map Method – Three, Four, Five and Six Variable maps. Prime implicants and essential Prime implicants. Don't care map entries, using the map for simplifying Boolean expressions, Tabular method, partially specified expressions, Multi-output minimizations.

UNIT-III

Design of Combinational Circuits: Adders, Subtractors, Multiplexers, Realization of Switching Functions using Multiplexers, De-multiplexers, Decoders, Encoders, Priority Encoder, Comparators, Parity Generators, Code Converters. Static Hazards and Hazard Free Realizations.

UNIT-IV

Synthesis of Symmetric Networks and Threshold Logic: Relay Contacts, Analysis and Synthesis of Contact Networks, Symmetric Networks, Identification of Symmetric Functions and realization of the same. Threshold Element, Capabilities and Limitations of Threshold logic, Elementary Properties, Synthesis of

threshold networks (Unate function, Linear seperability, Identification and realization of threshold functions, Map based synthesis of two-level Threshold networks).

UNIT-V

Sequential Machines Fundamentals and Counters and Shift Registers: Introduction, NAND/NOR latches, SR, JK, JK Master slave, D and T Flip-flops, Excitation functions of SR, JK, JK Master Slave, D and T Flip-flops. State table, State Diagram, State Assignment. Finite State Model - Basic Definitions. Synthesis of Synchronous Sequential circuits - Sequence Detector, Serial Binary adder, Binary counter and Parity bit generator. Ripple Counter, Shift Registers and their types, Ring Counters, Twisted Ring Counters.

TEXT BOOKS:

1. Switching and Finite Automata Theory- Zvi Kohavi & Niraj K. Jha, 2nd Edition, 2009, Cambridge University Press.
2. Digital Design- Morris Mano, PHl, 3rd Edition.

REFERENCE BOOKS:

1. Thomas L. Floyd, "Digital Fundamentals - A Systems Approach", Pearson, 2013.
2. Charles H. Roth, "Fundamentals of Logic Design", Cengage Learning, 5th Edition, 2004.

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18EE2102 – ELECTROMAGNETIC FIELDS

B.Tech. EEE - II Year I Sem.

L	T	P/D	C
3	1	-/-	4

Prerequisite(s): 18PH1102 - Applied Physics
18MA1101 - Mathematics-I

Course Objectives: Develop ability to

1. Understand Electrostatic Fields and their applications namely, calculation of electric field using Coulomb's law and Gauss's law.
2. Estimate the torque due to an electric dipole in an external electric field.
3. Understand the behavior of a magnetic field using Biot-Savart's law and Ampere's law.
4. Understand Faraday's laws of Electromagnetic induction and their applications.
5. Understand the concepts of time varying Electric and Magnetic fields and Maxwell's equations.

Course Outcomes: At the end of the course, student would be able to

CO 1: Calculate the field intensity for distribution of charges namely, point, line and surface.
CO 2: Determine potential difference due to any type of charge.
CO 3: Compute magnetic field intensity due to different current distributions by applying Biot-Savart's law and Ampere's circuital law.
CO 4: Calculate magnetic forces for circular, square and solenoid current distributions.
CO 5: Determine the relation between time varying Electric and Magnetic fields and hence deduce Maxwell's equations for time varying electromagnetic fields

UNIT-I

Electrostatic Fields: Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Gauss law – Application of Gauss Law – Maxwell's first law, div (D)=ρ_v.

UNIT-II

Electric dipole: Electric dipole – Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field. Conductors and insulators, electric field inside a dielectric material - polarization, capacitance. Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity.

UNIT-III

Magneto Statics: Static magnetic fields – Biot - Savart's law – Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div(B)=0. Magnetic circuits - concept of self and mutual inductance-dot convention - coefficient of coupling-composite magnetic circuit-analysis of series and parallel magnetic circuits.

UNIT–IV

Ampere's Circuital Law and its Applications: Ampere's circuital law and its applications viz. MFI due to

an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Maxwell's third equation, Curl (H)=Jc, Field due to a circular loop, rectangular and square loops. Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic Field. Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field. Energy stored and density in a magnetic field.

UNIT-V

Time varying fields: Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation, Curl (E)=-dB/dt – Statically and Dynamically induced EMFs – Simple problems -Modification of Maxwell's equations for time varying fields – Displacement current.

TEXT BOOKS

1. "Engineering Electromagnetics" by William H. Hayt and John. A. Buck Mc. Graw-Hill Companies, 7th Edition 2009.
2. "Electromagnetic Fields" by Sadiku, Oxford Publications

REFERENCE BOOKS:

1. "Introduction to Electro Dynamics", D J Griffiths, Printice hall of ndiapvt.Ltd.
2. "Electromagnetics-Problems and solutions", William H.Hayt&John.A. Buck McGraw Hill Companies.
3. "Electromagnetic Fields", Y.Mallikarjuna Reddy, Universities Press.

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18EE2103 – ELECTRICAL CIRCUITS

B.Tech EEE - II Year I Sem.

L	T	P/D	C
3	1	-/-	4

Prerequisite(s): 18PH1102 Applied Physics
18MA1101 Mathematics I

Course Objectives: Develop an ability to

1. Understand basic concepts of electrical circuits
2. Understand different analysis techniques
3. Apply theorems to electrical circuits
4. Create a network graph
5. Analyze network graphs

Course Outcomes: At the end of the course, student would be able to

CO1. Know the concepts of DC circuits
CO2. Know the concepts of AC circuits
CO3. Solve networks using theorems
CO4. Obtain network graph for the given electrical network
CO5. Solve graphs using cut set and tie set analysis techniques

UNIT–I

Introduction to Electrical Circuits: Circuit Concept, R-L-C Parameters, voltage and current Sources, Independent and Dependent Sources, Source Transformation, Voltage – Current relationship for Passive Elements (for different input signals –Square, Ramp, Saw tooth and Triangular). Kirchhoff's Laws, Network Reduction Techniques – Series, Parallel, Series Parallel, Star –to-Delta or Delta-to-Star Transformations, Nodal Analysis, Mesh Analysis, Super node and Super mesh for DC Excitations.

UNIT–II

Single Phase A.C. Circuits: R.M.S. and Average values and form factor for different periodic wave forms, Steady State Analysis of R, L and C (in Series, Parallel and Series Parallel Combinations) with Sinusoidal Excitation, Concept of Reactance, Impedance, Susceptance and Admittance, Phase and Phase difference, Concept of Power Factor, Real and Reactive powers, J-notation, Complex and Polar forms of representation, Complex power.

UNIT–III

Locus diagrams and Resonance: Locus diagrams - series R-L, R-C, R-L-C and parallel combination with variation of various parameters - Resonance-series, parallel circuits, concept of band width and Q factor.

UNIT–IV

Network Topology: Definitions, Graph, Tree, Basic cut-set and Basic Tie set Matrices for Planar Networks, Loop and Nodal methods for analysis of Networks with Dependent & Independent Voltage and Current Sources, Duality & Dual Networks.

UNIT–V

Network Theorems (With A.C. & D.C): Tellegen's, Superposition, Reciprocity, Thevinin's, Norton's, Maximum Power Transfer, Milliman's and Compensation theorems for D.C excitations.

TEXT BOOKS:

1. Engineering Circuit Analysis - William Hayt, Jack E. Kemmerly, S M Durbin, Mc Graw Hill Companies.
2. Electric Circuits - A.Chakrabarhty, Dhanipat Rai & Sons.

REFERENCE BOOKS:

1. Network analysis - N.C Jagan and C. Lakhminarayana, BS publications.
2. Electric Circuit Analysis - K.S.Suresh Kumar, Pearson Education.
3. Electrical Circuits - David A.Bell, Oxford University Press.
4. Network Analysis and Circuits - M.Arshad, Infinity Science Press.
5. Circuits - A.Bruce Carlson, Cengage Learning.
6. Electrical Circuits: An Introduction - KCA Smith & RE Alley, Cambridge University Press.

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Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18ME21L2 - FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

B.Tech. EEE - II Year I Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): **None**

Course Objectives: Develop ability to

1. Understand fundamental principles of fluid mechanics to solve practical mechanical engineering problems of water conveyance in pipes and pipe networks.
2. Understand application of hydraulic machinery.
3. Learn to conduct performance tests on pumps and turbines.
4. Understand operating characteristics and factors affecting performance of hydraulic machinery (pumps and turbines).
5. Understand the Bernoulli's theorem

Course Outcomes: At the end of the course, student would be able to

CO1. Demonstrate basic knowledge of fluid mechanics in solving problems and design of pressure pipe systems used in mechanical engineering
CO2. Verify Bernoulli's principle.
CO3. Conduct experiment and interpret the data on major and minor losses.
CO4. Calibrate flow discharge measuring device used in pipes, channels and tanks.
CO5. Apply basics of hydraulic machinery and their operation in water systems.

LIST OF EXPERIMENTS:

1. Impact of jet on vanes.
2. Calibration of venturi meter.
3. Calibration of orifice meter.
4. Determination of friction factor for a given pipe.
5. Determination of loss of head due to sudden contraction.
6. Verification of Bernoulli's theorems.
7. Performance test on Pelton wheel.
8. Performance test on Francis turbine.
9. Performance test on Kaplan turbine.
10. Performance test on single stage centrifugal pump.
11. Performance test on multi stage centrifugal pump.
12. Performance test on reciprocating pump.

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EC21L1– DIGITAL DESIGN LAB

B.Tech EEE - II Year I Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): None

Course Objectives: Develop ability to

1. Understand the functionality of various logic gate ICs
2. Understand the functionality of combinational logic circuit ICs
3. Understand the functionality of Sequential logic circuit ICs
4. Implement the logic functions using Combinational logic Circuit ICs.
5. Realize the sequential logic functions using various ICs.

Course Outcomes: At the end of the course, student would be able to

CO 1: Analyze the functionality of various logic gates.
CO 2: Analyze the operation of various Combinational logic circuit ICs
CO 3: Analyze the behaviour of various Sequential logic circuit ICs
CO 4: Design and implement combinational logic circuits using ICs on Trainer kits.
CO 5: Design and implement Sequential logic circuits using ICs on Bread Boards and Trainer kits.

Note: To perform any twelve experiments choosing at least FIVE from each PART.

PART A: To Verify the Functionality of the following using Bread-boards / IC kits

1. 4-bit binary Adder (7483).
2. 8x1 Multiplexer (74151).
3. 3-8 Decoders (74138).
4. Decade Counter (7490).
5. Universal Shift Register (74194/195).
6. 4- Bit Comparator (7485)
7. Priority Encoder (74148)

PART B: To design and implement the following logic circuits using basic gates and other ICs

1. Full Adder and Full Subtractor using a) 3 to 8 Decoder, b) 4 to 1 Multiplexer.
2. 4 bit adder/Subtractor using Full Adders.
3. BCD adder using Full Adders
4. Two bit carry lookahead adder using Full Adders.
5. 4 Bit Binary to Gray code converter.
6. BCD to Excess-3 code converter
7. Digital clock using counters for Seconds.
8. Decade counter using a Binary counter.
9. 2 Bit comparator using gates.
10. BCD to 7 segment driver circuit.
11. Design a 4 bit Twisted Ring counter / Johnson counter using 4 bit shift registers.

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EE21L2 – ELECTRICAL CIRCUITS LAB

B.Tech. EEE - II Year I Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): None

Course Objectives: Develop ability to

1. Apply Kirchhoff's laws (KVL and KCL).
2. Verify network theorems using physical electrical elements and with PSPICE.
3. Understand the concept of resonance
4. Draw locus diagrams of RLC variable circuits.
5. Understand basic concepts of AC circuits

Course Outcomes: At the end of the course, student would be able to

CO 1: Distinguish the basic circuit components and Use them in real electrical circuit.
CO 2: Use basic electrical measurement instruments in different types of measurements.
CO 3: Apply the laws and understands principles of electrical circuits.
CO 4: Apply different theorems to different practical circuits.
CO 5: Determine the locus of different electrical circuits.
CO 6: Determine the average and RMS values of AC signals.

LIST OF EXPERIMENTS:

PART-A:

1. Verification of Kirchhoff's Laws (KVL and KCL).
2. Verification of Superposition and Reciprocity Theorems
3. Verification of Thevenin's and Norton's Theorems.
4. Verification of Maximum Power Transfer Theorem
5. Verification of Millman's and Compensation Theorems.
6. Determination of Average value and RMS value of complex wave.
7. Locus diagrams of R-L and R-C series circuits.
8. Series and Parallel resonance of RLC circuits.

PART-B: Simulation of (Any two of the following must be conducted)

1. Maximum Power Transfer Theorem
2. Thevinin's and Norton's Theorem
3. Mesh analysis
4. Nodal analysis

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Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18CH2101-ENVIRONMENTAL SCIENCE

B.Tech. EEE - II Year I Sem

L	T	P/D	C
3	-	-/-	-

Prerequisite(s): None

Course Objectives: Develop ability to

1. Identify the importance of ecosystem and its functions.
2. Understand the natural resources and their usage in day to day life.
3. Understand the concept of bio-diversity, its values and conservation.
4. Be aware of the causes of different types of pollution and its control.
5. Understand various environmental impacts, requirement of various policies,
6. and legislations towards environmental sustainability.

Course Outcomes: At the end of the course, student would be able to

CO1. Explain ecosystem and its functions namely, food chain, ecological pyramids etc.
CO2. Acquire knowledge about different types of natural resources such as land, water, minerals, non-renewable energy and their excessive usage leading to detrimental effects on environment.
CO3. Comprehend ecosystem diversity, its values and importance of hot spots to preserve the same.
CO4. Explain different types of pollution, its control and impact on global environment.
CO5. Recognize various environmental impacts and the importance of various acts and policies towards environmental sustainability.

UNIT-I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification, Field visits.

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy Resources-renewable and non-renewable .

UNIT- III

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of bio diversity, consumptive use, productive use, social, ethical, aesthetic and optional values. Hot spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution:

Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards. Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies. Global Environmental Issues and Global Efforts - Green House Gases And its effect, Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC - GoI Initiatives.

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economic aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS.Publications.

B.Tech (EEE)
II Year II Sem
Detailed Syllabus

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EE2201–SIGNALS, SYSTEMS AND TRANSFORM TECHNIQUES

B.Tech EEE - II Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18MA1101 –Mathematics - I
18MA1201 –Mathematics – II
18MA2101 – Complex Variables

Course objectives: Develop ability to

1. Distinguish different types of Signals, Systems and basic operations on a signals and understand the Fourier series representation of periodic signals.
2. Understand the conversion of both periodic and aperiodic continuous/discrete time domain signal into frequency domain using Fourier transform and the concept of sampling theorem.
3. Understand the characteristics of a linear time invariant system and the concepts of convolution and correlation.
4. Understand usage of Laplace transforms in the analysis of continuous time systems.
5. Understand usage of Z transforms in the analysis of discrete time systems.

Course Outcomes: At the end of the course, student would be able to

CO 1. Analyze a given signal in Time domain and frequency domain using Fourier series.
CO 2. Analyze a given signal/system using Fourier transforms.
CO 3. Analyze a given LTI systems and perform convolution / correlation on signals / systems.
CO 4. Analyze a given signal/system using Laplace transform / domains and solve linear differential equations using Laplace transforms.
CO 5. Analyze a given signal/system using Z transform / domains and solve linear difference equations using Z- transforms.

UNIT–I

Signal Analysis: Introduction to signals and systems, classification of signals, basic operations on signals, classification of systems, Analogy between vectors and signals, Orthogonal signal space, Approximation of a Function using Mutually orthogonal functions, Mean square error, Closed or complete set of Orthogonal functions, Orthogonality in complex functions. Fourier Series - Fourier series representation of continuous time periodic signals, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Properties of Fourier series, Complex Fourier spectrum, Gibb's phenomenon.

UNIT-II

Fourier Transforms: Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, Properties of Fourier transforms, Fourier transforms involving impulse function and Signum functions. Inverse Fourier transforms, Introduction to Hilbert Transform. Sampling - Sampling theorem – Graphical and analytical proof for Band Limited Signals, Types of Sampling - Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass sampling.

UNIT-III

Signal Transmission through Linear Systems: Linear Time Invariant (LTI) systems, Linear Time Variant (LTV) systems, Transfer function of a LTI system. Impulse response of LTI system, distortion less transmission through a LTI system. Convolution and Correlation - Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution property of Fourier transforms, Response of a system using convolution. 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 the convolution and correlation. Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT-IV

Laplace Transforms: Review of Laplace transforms, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of Laplace transforms, Laplace transform of certain signals using waveform synthesis. Inverse Laplace transform, partial fraction expansion, solution of differential equations using Laplace transforms,

UNIT-V

Z–transforms: Concept of Z- transform of a discrete signal, Region of convergence in Z-transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms, solution of difference equations using Z transform. Distinction between Laplace, Fourier and Z Transforms.

TEXT BOOKS:

1. Signals, Systems & Communications – B.P. Lathi, BS Publications, 2003.
2. Signals and Systems – A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.

REFERENCE BOOKS:

1. Signals and Systems: Continuous and Discrete by Rodger E.Ziemer , William H Tranter , D. R. Fannin, 4th Edition Pearson Education Limited.
2. Signals and systems, Schaum's outlines – Hwei Hsu, McGraw Hill Professional, 1995
3. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2 Ed

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EE2202–POWER SYSTEMS-I

B.Tech EEE - II Year II Sem

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18EE2103 - Electrical circuits.
18ME2103 - Fluid Mechanics and Hydraulic Machinery

Course Objectives: Develop ability to

1. Understand basic principles of power generation, transmission and distribution.
2. Understand the functioning of hydel, thermal and nuclear power stations.
3. Understand functioning of D.C and A.C distribution systems.
4. Understand static VAR compensators for improving power factor and economic aspects of power generation.
5. Understands the economic aspects of power generation.

Course Outcomes: At the end of the course, student would be able to

CO 1: Distinguish and analyze different types of power generation, transmission and distribution methods.
CO 2: Identify hydel, thermal and nuclear power stations and draw their layout.
CO 3: Analyze the parameters of D.C and A.C distribution systems.
CO 4: Design static VAR compensators for improving power factor and calculate generation parameters and tariff.
CO 5: Calculate cost of generation and other tariffs.

UNIT-I

Introduction to Power Systems and Hydel Power plant: Introduction to different sources of energy and general discussion on their application to generation, general introduction to power transmission by DC and AC overhead lines and underground cables and their comparison, per unit system, single line diagram. Hydel Power Plant - classification of plants, base load and peak load station, turbines, head gate, penstock, surge tank, scroll case, draft tube and tail race, power plant auxiliaries. Electrical system - Excitation system, AVR: magnetic amplifier and thyristor converter type/DVR. Main transformer, unit transformer and station reserve transformer.

UNIT-II

Thermal and Nuclear 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. 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.

UNIT-III

General aspects of D.C and A.C Distribution Systems: Classification of Loads - Residential, Commercial, Agricultural and Industrial Loads and their characteristics. Classification of 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 both the ends (equal/unequal Voltages) and Ring Main Distributor. Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

UNIT-IV

Power Factor and Voltage Control: Causes of low p.f -Methods of improving p.f -Phase advancing and generation of reactive KVAR using static Capacitors-Most economical p.f. for constant KW load and constant KVA type loads, Numerical Problems. Dependency of Voltage on Reactive Power flow. Methods of Voltage Control: Shunt Capacitors, Series Capacitors, Synchronous Capacitors, Tap changing and Booster Transformers

UNIT-V

Economic Aspects of Power Generation and Tariff: Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, utilization and plant use factors- Numerical Problems. Cost 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.

TEXT BOOKS:

1. Electrical Power Systems by C.L.Wadhawa New age International (P) Limited, Publishers 1997.
2. Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI, 2003.

REFERENCE BOOKS:

1. A Text Book on Power System Engineering by R K Rajput, Laxmi Publications (P) New Delhi 2004
2. Generation of Electrical Energy, Dr B R Gupta, S. Chand.
3. Electrical Power Systems, PSR Murthy, BS Publications.
4. Principles of Power Systems - V.K Mehta and Rohit Mehta S. Chandand Company Ltd, New Delhi 2004

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EE2203 – NETWORK THEORY

B.Tech. EEE - II Year II Sem.

L	T	P/D	C
3	1	-/-	4

Prerequisite(s): 18MA1201- Mathematics - II

Course Objectives: Develop an ability to

1. Understand basic concepts of Magnetic Circuits
2. Understand fundamentals of single phase and three phase AC networks
3. Analyze transients in Electrical systems.
4. Evaluate Network parameters of given Electrical network
5. Design basic filter configurations

Course Outcomes: At the end of the course, student would be able to

CO 1: Apply the concepts of Magnetic circuits and analyze Magnetic circuits in reality
CO 2: Determine voltages and currents in single phase and three phase circuits with Star & Delta connected balanced and unbalanced loads.
CO 3: Analyze the transient behavior of electrical networks for various excitations
CO 4: Obtain the various network parameters for the given two port networks
CO 5: Determine the parameters for the design of various filters

UNIT–I

Magnetic Circuits: Faraday's laws of electromagnetic induction – concept of self and mutual inductance – dot convention – coefficient of coupling – composite magnetic circuit - analysis of series and parallel magnetic circuits.

UNIT–II

Three Phase AC circuits: Phase sequence – Star and delta connection – Relation between line and phase voltages and currents in balanced systems – Analysis of balanced and Unbalanced 3 phase circuits – Measurement of active and reactive power.

UNIT–III

DC and AC Transient Analysis: Transient response of R-L, R-C, R-L-C circuits (Series and Parallel combinations) for DC and AC excitations – Initial conditions – Classical method and Laplace transforms methods of solutions. Transient response of the above circuits for different inputs such as step, ramp, pulse and impulse by using Laplace transforms method.

UNIT–IV

Network Parameters: Network functions driving point and transfer impedance function networks- poles and zeros –necessary conditions for driving point function and for transfer function. Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations– 2- port network parameters using transformed variables.

UNIT – V

Filters: Introduction to filters –low pass – high pass and band pass – RC, RL, filters- constant K and m derived filters and composite filter design.

TEXT BOOKS:

1. "William Hayt and Jack E. Kemmerly", "Engineering circuit analysis", Mc Graw Hill Company, 6th edition, 2016.
2. "D. Roy Chowdary", "Networks and systems", New age international publishers, 2009.

REFERENCE BOOKS:

1. "Van Valkenburg", "Network Analysis", PHI, 3rd Edition, 2014
2. "N. C. Jagan & C. Lakshminarayana", "Network Theory", B.S Publications, 2014.
3. "A. Chakrabarthy", Circuit Theory, Dhanpat Rai, 2005.
4. "Franklin F Kuo," "Network Analysis & Synthesis", Wiley India PVT. Ltd., second Edition, 2006
5. "K.C. A. Smith & R. E. Alley", "Electrical Circuits", Cambridge University Press, 1992
6. "K. Rajeswaran", "Electric Circuit theory", Pearson Education, 2004.
7. "A. Bruce Carlson", "Circuits", Thomson Publishers, 1999

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EE2204–ELECTRICAL MACHINES-I

B.Tech EEE - II Year II Sem.

L	T	P/D	C
3	1	-/-	4

Prerequisite(s): 18EE2102-Electromagnetic Fields

Course Objectives: Develop ability to

1. Understand the fundamental principles of Electro-mechanical energy conversion.
2. Understand the fundamental principles of Electrical machines and the characteristics of DC Machines and Transformers**.**
3. Understand the machine windings and the MMF pattern of armature and field windings.
4. Understand operation and characteristics of DC machines and Transformers.
5. Examine the performance of DC Machines and Transformers.

Course Outcomes: At the end of the course, student would be able to

CO 1: Analyze structure of DC Electrical machines and their role in various applications.
CO 2: Apply the basic concepts of magnetic circuits to DC machines and Transformers.
CO 3: Conduct various performance tests on DC machines and Transformers.
CO 4: Evaluate various electrical and mechanical quantities associated with DC machines and Transformers.
CO 5: Distinguish DC motors and generators based on their characteristics.

UNIT-I

Electro-Mechanical Energy Conversion: Forces and torque in magnetic field systems – energy balance – energy and force in a singly excited magnetic field system, determination of magnetic force - co-energy– multi excited magnetic field systems. DC Generators construction and operation-DC Generators – Principle of operation – Action of commutator – constructional features – armature windings – lap and wave windings – simplex and multiplex windings – use of laminated armature – E.M.F Equation – Problems. Armature reaction in DC Generator -Armature reaction – Cross magnetizing and de-magnetizing AT/pole – compensating winding –commutation – reactance voltage – methods of improving commutation.

UNIT-II

Types of DC Generators: Types of DC Generators -Methods of Excitation – separately excited and self excited generators – build-up of E.M.F - critical field resistance and critical speed - causes for failure to self excite and remedial measures. Load Characteristics of shunt, series and compound generators – parallel operation of DC series generators – use of equalizer bar and cross connection of field windings – load sharing.

UNIT-III

DC Motors: Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation. Losses – Constant and Variable losses – calculation of efficiency – condition for Maximum efficiency. Speed control of DC Motors: Armature voltage and field flux control methods. Ward-Leonard system. Construction and operation of 3 point and 4 point starters.

UNIT-IV

Transformers: Constructional features of single phase and three phase transformers – EMF equation – Losses – Constant and Variable losses – calculation of efficiency – condition for Maximum efficiency. Transformer on No load and Load –Phasor diagram -equivalent circuit – Regulation –Efficiency-All day Efficiency- three phase transformer connections- parallel operation of single phase and three phase transformer- Auto transformers. All day efficiency.

UNIT-V

Testing of DC Machines and Transformer: Methods of Testing – direct, indirect and regenerative testing – brake test – Swinburne's test –Hopkinson's test – Field's test – Retardation test – separation of stray losses in a D.C. motor test. Polarity test, load test, open circuit and short circuit test, Sumpner's test on transformers.

TEXT BOOKS:

1. Electrical Machines by P.S Bimbra, Khanna publications
2. Electrical machinery by A.E Fritzergerald, C.Kingsly and S.Umans Mc Graw Hill Publications

REFERENCE BOOKS:

1. "Performance and Design of Alternating Machines ', Say M.G CBS Publishers and Distributors, New Delhi, First Indian Edition, Reprint 1998
2. "Electric Machinery and Transformers", Irving L.Kosow, Prentice Hall of India Private Ltd., New Delhi, Second Edition, Reprint 2007
3. "Electric Machinery Fundamentals', Stephen J.Chapman, "McGraw Hill Intl. Edition, New Delhi, Fourth Edition, 2005
4. Electrical Machines by B.L.Thereja.
5. Electrical Machines by –S.K Bhattacharya
6. Electrical Machines by –I.J.NagrathandD.P.Kothari

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Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18MB2202-ENGINEERING ECONOMICS AND ACCOUNTING

B.Tech EEE - II Year II Sem.

L	T	P/D	C
3	-	-	3

Prerequisites: None

Course Objectives: Develop ability to

1. Learn the basic Business types
2. Understand the impact of the Economy on Business and Firms specifically.
3. Analyze the Business from the Financial Perspective.
4. Understand the importance of handling Capital.
5. Learn fundamental concepts of accounting.

Course Outcomes: At the end of the course, student would be able to

CO1. Understand Business and the impact of economic variables on them.
CO2. Understand the Demand, Supply concepts.
CO3. Analyze the Production, Cost, Market Structure, Pricing aspects.
CO4. Understand capital structure.
CO5. Study the Financial Statements of a Company.

UNIT–I

Introduction to Business and Economics: Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance. Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT–II

Demand and Supply Analysis: Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting. Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT-III

Production, Cost, Market Structures & Pricing: Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions. Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, and Monopolistic Competition.

Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, and Cost Volume Profit Analysis.

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 (AR A) and Net Present Value Method (simple problems).

UNIT-V

Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, and Preparation of Final Accounts.

TEXT BOOKS:

1. Managerial Economics, Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.
2. Financial Management, S.N.Maheswari & S.K. Maheswari, Vikas, 2012.

REFERENCES BOOKS:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

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Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EE22L1 – SIGNALS, SYSTEMS AND TRANSFORM TECHNIQUES LAB

B.Tech. EEE - II Year II Sem

L	T	P/D	C
-	-	2/-	1

Prerequisite(s):18MA2101–Complex Variables

Course Objectives: Develop ability to

1. Understand simulation of various signals/sequences and their synthesis
2. Understand various operations such as addition, multiplication, amplitude/time scaling, shifting and folding of signals / sequences
3. Understand the characteristics of an LTI system and find its response for various input signals such as unit impulse, unit step and sinusoidal signal.
4. Understand the principle of convergence of Fourier Series of a given signal
5. Convert time domain signal into frequency domain signal

Course Outcomes: At the end of the course, student would be able to

CO 1. Synthesize a given waveform using standard test signals and sequences.
CO 2. Analyze the effect of various transformations applied on independent and dependent variables of a signal
CO 3. Find the symmetry (even/odd) of signals /sequences
CO 4. Classify a system based on its characteristics and find its response for various excitations
CO 5. Convert time domain signal into frequency domain using Fourier transform and plot its magnitude and phase spectrum.

Note: All the experiments are to be simulated using SCILAB / OCTAVE or equivalent software

LIST OF EXPERIMENTS:

1. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sine.
2. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
3. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of a Complex Signal.
4. Convolution between (i) signals and (ii) sequences.
5. (a) Auto Correlation of(i) signals and (ii) sequences.
   (b) Cross Correlation between (i) signals and (ii) sequences.
6. Verification of Linearity and Time Invariance Properties of a given Continuous/ Discrete System.
7. For the given LTI system, compute Unit sample, Unit step and Sinusoidal responses.
   a) Verify the physical realizability and stability properties.
   b) Locating the poles and zeros in s-plane and z-plane.
8. Verification of Gibbs Phenomenon.
9. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
10. Waveform Synthesis using Laplace Transform.

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EE22L2–NETWORK THEORY LAB

B.Tech. EEE - II Year II Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): 18EE2103-Electrical Circuits

Course Objectives: Develop ability to

1. Calculate self and mutual inductances.
2. Determine network parameters.
3. Measure power in three phase circuits.
4. Understand the transient behavior of RLC circuits.
5. Simulate different electrical circuits.

Course Outcomes: At the end of the course, student would be able to

CO 1. Obtain self and mutual inductance of magnetic circuits.
CO 2. Obtain network parameters.
CO 3. Find three phase power.
CO 4. Get transient response of RLC circuits.
CO 5. Simulation of different electrical networks.

LIST OF EXPERIMENTS:

PART-A:

1. Determination of self and mutual inductances and co efficient of coupling.
2. Determination of Z and Y parameters.
3. Determination of Transmission Line and Hybrid Parameters.
4. Measurement of Active Power for Star and Delta connected balanced loads
5. Measurement of Reactive power for Star and Delta connected balanced loads
6. Measurement of 3-phase power by two watt meter method for unbalanced loads.
7. Time response of first order RC / RL networks.
8. Transient Response of RLC networks

PART-B: Simulation of (Any two of the following must be conducted)

1. AC circuits
2. DC Transient response
3. AC Transient response
4. Mesh analysis
5. Nodal analysis

Note: Simulation will be done using any freeware like octave/PSIM etc.

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Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EE22L3–ELECTRICAL MACHINES-I LAB

B.Tech. EEE - II Year II Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): 18EE2102-Electromagnetic Fields

Course Objectives: Develop ability to

1. Understand the characteristics of DC shunt generator.
2. Understand the performance of DC shunt and compound generators.
3. Predetermine the efficiency of DC shunt machines.
4. Understand the speed controlling techniques of DC shunt motors.
5. Understand different testing techniques of transformers.

Course Outcomes: At the end of the course, student would be able to

CO 1: Evaluate the critical field resistance and critical speed of DC shunt generator.
CO 2: Calculate the performance characteristics namely, power efficiency, output power (BHP), torque and speed of a DC series and shunt machine.
CO 3: Experimentally validate theoretical efficiency of DC shunt machine under full load condition.
CO 4: Evaluate efficiency of a single phase Transformer and find the equivalent circuit parameters.
CO 5: Evaluate efficiency of a pair of identical single phase transformers on full load condition.
CO 6: Analyze the conversion of three phase supply to two phase supply.

LIST OF EXPERIMENTS:

(*Any ten of the twelve Experiments)*

1. Magnetization characteristics DC shunt generator. Determination of critical field Resistance critical speed.
2. Load test on DC shunt generator. Determination of characteristics.
3. Brake test on DC shunt motor. Determination of performance curves.
4. Load test on DC compound generator. Determination of characteristics.
5. Hopkinson's test on DC shunt machines. Predetermination of efficiency.
6. Fields test on DC series machines. Determination of efficiency.
7. Swinburne's test and speed control of DC shunt motor. Predetermination of efficiencies.
8. Load test on DC Series generator. Determination of characteristics.
9. OC and SC Test on single phase Transformer.
10. Sumpner's Test on single phase Transformer's.
11. Parallel operation of two single phase Transformers.
12. Three phase to two phase conversion.

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EN2201-GENDER SENSITIZATION

B.Tech. EEE - II Year II Sem.

L	T	P	C
-	-	2/-	-

Prerequisite(s): None

Course Objectives: Develop ability to

1. Develop student's sensibility with regard to issues of gender in contemporary India.
2. Provide a critical perspective on the socialization of men and women.
3. Introduce students to information about some key biological aspects of genders.
4. Expose the students to debates on the politics and economics of work.
5. Help students reflect critically on gender violence.
6. Expose students to more egalitarian interactions between men and women.

Course Outcomes: At the end of the course, student would be able to

CO 1. Students will have developed a better understanding of important issues related to gender in contemporary India.

CO 2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.

CO 3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.

CO 4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.

CO 5. Men and women students and professionals will be better equipped to work and live together as equals.

CO 6. Students will develop a sense of appreciation of women in all walks of life.

CO 7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

UNIT-I

Understanding Gender: Introduction: Definition of Gender-Basic Gender Concepts and Terminology Exploring Attitudes towards Gender- Construction of Gender- Socialization: Making Women, Making Men-Preparing for Womanhood. Growing up Male. First lessons in Caste.

UNIT-II

Gender Roles And Relations: Two or Many? -Struggles with Discrimination- Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

UNIT-III

Gender and Labour: Division and Valuation of Labour- House work: The Invisible Labor-"My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics-Fact and Fiction. Unrecognized and

Unaccounted work.- Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

UNIT-IV

Gender - Based Violence: The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing-Coping with Everyday Harassment- Dowry Harassment Protection Acts-Further Reading: "Chupulu". Domestic Violence: Speaking Out Is Home a Safe Place?-When Women Unite[Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

UNIT-V

Gender and Culture: Gender and Film- Gender and Electronic Media- Gender and Advertisement-Gender and Popular Literature- Gender Development Issues -Gender Sensitive Language-Gender and Popular Literature- Just Relationships: Being Together as Equals Mary Kom and On love. Love and Acid just do not Mix. Love Letters- book by Savithri Phule-Mothers and Fathers. Rosa Parks-The Brave Heart.

Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".

TEXT BOOK(S):

1. "Towards a World of Equals: A Bilingual text book on Gender" written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu, Telugu Akademi, Telangana Government in 2015.

B.Tech (EEE)
III Year I Sem.
Detailed Syllabus

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EE3101 - POWER SYSTEMS – II

B.Tech. EEE - III Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18EE2202 – Power Systems - I
18EE2103 – Electrical Circuits

Course Objectives: Develop ability to

1. Compute different parameters of transmission lines.
2. Estimate the efficiency and regulation of transmission lines.
3. Understand the effect of factors governing the performance of long transmission line.
4. Design overhead line insulators and to estimate the sag and tension in transmission lines.
5. Understand the concepts of underground cables.

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Model the transmission lines.
CO2. Determine the performance characteristics of transmission lines.
CO3. Determine the factors that govern the performance of the transmission lines.
CO4. Develop string insulators for all voltage levels
CO5. Model the underground cables and determine its performance.

UNIT – I

Transmission Line Parameters: Types of conductors – calculation of resistance for solid conductors – Calculation of inductance for single phase and three phase, single 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 circuit lines, Numerical Problems.

UNIT – II

Performance of Short and Medium Length Transmission Lines: Classification of Transmission Lines – Short, medium and long line and their model representations – Nominal- T, Nominal-Pie and 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

Performance of Long Transmission Lines: Long Transmission Line-Rigorous Solution, evaluation of A, B, C, D Constants, Interpretation of the Long Line Equations, Incident, Reflected and Refracted Waves.

UNIT – III

Power System Transients: Types of System Transients – Travelling or Propagation of Surges – Attenuation, Distortion, 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).

Various Factors Governing the Performance of Transmission line: Skin and Proximity effects – Description and effect on Resistance of Solid Conductors – Ferranti effect – Charging Current. Corona – Description of the phenomenon, factors affecting corona, critical voltages and power loss.

UNIT – IV

Overhead Line Insulators: 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: 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, HV Cables.

TEXT BOOKS:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar, and A. Chakrabarthy, DhanpatRai& Co Pvt. Ltd.
2. Electrical power systems – by C.L.Wadhwa, New Age International (P) Limited, Publishers,1998.

REFERENCE BOOKS:

1. Power system Analysis-by John J Grainger William D Stevenson, TMC Companies, 4th edition
2. Power System Analysis and Design by B.R.Gupta, Wheeler Publishing.
3. Power System Analysis by HadiSaadat – TMH Edition.
4. Modern Power System Analysis by I.J.Nagaraj and D.P.Kothari, Tata McGraw Hill, 2nd Edition.

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EE3102 – ELECTRICAL MACHINES-II

B.Tech. EEE - III Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18EE2204 – Electrical Machines-I

Course Objectives: Develop ability to

1. Understand construction, working principle, phasor diagram analysis, characteristics and torque equations of poly phase induction motor and single phase induction motors.
2. Understand performing tests on induction motors and determination of performance indices using circle diagram and also speed control of induction motors.
3. Understand construction, working principle, phasor diagram analysis, characteristics of synchronous machines.
4. Understand determination of regulation of synchronous generator by different method and parallel operation of synchronous alternators.
5. Understand the concepts of improving power factor by synchronous motors and its applications.

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Analyze construction, operation, characteristics of Induction motors and also able to determine torque.

CO2. Compute power, torque and efficiency of induction motor by performing suitable tests and also able to do speed controlling of induction motor.

CO3. Analyze construction, operation, production of EMF and suppression of harmonics in a synchronous machine.

CO4. Determine the regulation of synchronous alternator to analyze its losses (voltage drop) and able to compensate reactive power using synchronous motors.

CO5. Select appropriate AC machine for any application and appraise it significance.

UNIT – I

Poly-Phase Induction Machines: Construction- Types- production of rotating magnetic field – principle of operation – rotor parameters at standstill and during operation. Rotor power inter relation – torque equation – expression for maximum torque and starting torque – torque slip characteristics – double cage and deep bar rotors – equivalent circuit – phasor diagram – crawling and cogging. Induction generator: principle of operation.

UNIT – II

Testing of Induction Motors: No load and blocked rotor tests – predetermination of performance indices – methods of starting and starting current and torque calculations

Speed Control of Induction Motor: Change of voltage, change of frequency, voltage/frequency, Injection of an EMF into rotor circuits (Qualitative treatment only)

Single Phase Induction Motor: Constructional features – double revolving and cross field theory – equivalent circuit – torque slip characteristics – types of single phase induction motors.

UNIT – III

Synchronous Machines & Characteristics: Constructional features of round rotor and salient pole machines – armature winding – integral slot and fractional slot windings; distributed and concentrated windings – distribution, pitch and winding factor – E.M.F equation. Harmonics in generated EMF – suppression of harmonics – armature reaction – leakage reactance – synchronous reactance and impedance – experimental determination – phasor diagram and load characteristics – salient pole machines – two reaction analysis – phasor diagrams.

UNIT – IV

Regulation Of Synchronous Generator: Synchronous impedance method, MMF method, ZPF method and ASA method – experimental determination of $\mathbf{X_d}$ & $\mathbf{X_q}$ (slip test) – regulation of salient pole alternators.

Parallel Operation of Synchronous Generator: Synchronizing alternators with infinite bus bars – synchronizing power torque – parallel operation and load sharing - effect of change of excitation and mechanical power input. Analysis of short circuit current wave form - determination of sub-transient, transient and steady state reactances

UNIT – V

Synchronous Motors: Theory of operation – phasor diagram – variation of current and power factor with excitation – synchronous condenser – Mathematical analysis for power developed. Hunting and its suppression, methods of starting – synchronous induction motor – merits and demerits of synchronous motors – applications of synchronous motors

TEXT BOOKS:

1. Dr. P.S. Bimbra, **Electrical Machinery** – khanna publications
2. "Electrical machines", Nagrath I.J. and Kothari D.P, Tata Mc Graw hill, 2010.

REFERENCE BOOKS:

1. "Theory of AC machines", A.S langsdorf, Tata Mc Graw hill, 2001
2. "Electric Machinery ", A.E Fitzagerald, Charles kingsley and S.D Umans, Tata McGraw hill, 2003
3. "Electric machines", C.I Hubert, pearson edition,2003.
4. "Problems in Electrical Engineering", Parkar smith, N.N, CBS publishers and distrubuters.

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EE3103–CONTROL SYSTEMS

B.Tech. EEE - III Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):18PH1102 – Applied Physics
18MA1202 – Computational Mathematics

Course Objectives: Develop ability to

1. Understand basic systems and their open loop and closed loop characteristics
2. Understand mathematical modeling of systems and their representation.
3. Understand time domain analysis in first order and second order system and their design.
4. Understand the concept of stability and methods to determine stability
5. Understand frequency domain analysis and stability analysis through frequency plots.

Course Outcomes (COs): At the end of the course**,** student would be able to

CO1. Identify and distinguish different systems and understand the importance of feedback.
CO2. Do mathematical modeling of physical systems and acquire knowledge of various representations methods.
CO3. Study first order and second order systems and analyze their characteristic responses.
CO4. Acquire knowledge to implement time domain stability analysis of given systems.
CO5. Perform frequency domain analysis and design compensators for stable systems.

UNIT – I

Introduction to Control Systems: Concepts of control system – Classification of control systems- Open Loop and closed loop systems and their characteristics – Types of systems with examples - Introduction to Feedback - Characteristics and effects of feedback

UNIT – II

Mathematical Modeling of systems: Mathematical modeling of electrical, mechanical and electromechanical systems (DC machines only) – Transfer function representation, Block diagram algebra, Representation by signal flow graph and Mason's gain formula**.**

UNIT – III

Time Response Analysis: Introduction to time and frequency domain analysis, Standard test signals, Time response of first and second order systems-Transfer function, Characteristic equation, Steady state and transient response, Time domain specifications, Steady state errors and error constants– Introduction to design-P, PI and PID controllers**.**

UNIT – IV

Stability Analysis in time domain: The concept of stability–Routh's stability criterion, Root locus method-rules and construction of root loci.

UNIT – V

Frequency Response Analysis: Introduction to frequency domain analysis and methods –Bode Plots, Polar Plots, Nyquist Plots, Stability Analysis, Introduction to Lag, Lead, Lead-Lag compensators - Introduction to State Space analysis.

TEXT BOOKS:

1. "Control Systems Engineering", I.J.Nagrath and M.Gopal, New Age International(P)Limited, Publishers.
2. "Control Systems Engineering", 6th Edition Norman S. Nise, Wiley.

REFERENCEBOOKS:

1. "Control Systems – Principles and Design" , M.Gopal, Tata McGraw hill Publication
2. "Automatic Control Systems", Farid Golnagarhi, Benjamin.C.Kuo, Wiley & Sons.
3. "Modern Control Engineering", Katsuhiko Ogata, Prentice Hall of India.
4. "Control Systems", A.Jairath, Ane Books Ltd.

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EE3104 – WIND AND SOLAR ENERGY SYSTEMS
(Professional Elective - I)

B.Tech. EEE - III Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18EE3201 – Power Electronics
18EE2202 – Power Systems - I

Course Objectives: Develop ability to
1. To create the awareness of energy conservation in students.
2. To have knowledge on environmental effects of energy conservation.
3. To analyze solar and wind energy storage methods.
4. To introduce photo voltaic systems.
5. To understand details about manufacture, sizing and operating techniques of solar and wind energy systems.

Course Outcomes (COs): At the end of the course, student would be able to
CO1. Familiarize the importance of solar power.
CO2. Understand the techniques of storing and utilizing solar power.
CO3. Identify photovoltaic system components and system types.
CO4. Familiarize the concepts to extract energy from wind.
CO5. Understand the concepts of different types of wind turbines.

UNIT – I
Principles of solar radiation: Role and potential of renewable source –Environmental impact of solar power – Sun and Earth – Solar Geometry – Extraterrestrial and terrestrial solar radiation– Solar radiation on tilted surface – Instruments for measurement of solar radiation – Solar radiation data.

UNIT – II
Solar Energy Collection and Storage: Flat plate and concentrating collectors –Classifications of concentrating collectors –Advanced collectors–Solar pond– Different methods of solar energy storage – Sensible, Latent heat storage – Solar applications – Solar heating/cooling technique – Solar distillation and drying.

UNIT – III
Photovoltaic systems: Solar cells– Equivalent circuit –V-I characteristics–Performance improvement – Photovoltaic modules– Design requirements –Types of Photovoltaic systems – Maximum Power Point Tracker (MPPT) –algorithms. Perturb & Observe – Incremental conductance method – Hill climbing method – Grid connected PV systems.

UNIT – IV
Wind Energy: Sources and potential – Basics of wind energy – Wind characteristics – Extraction of wind energy – Betz criteria –Wind energy conversion systems –block diagrams – Applications.

UNIT – V

Wind Energy conversion: Classification of wind turbines – Types of rotors – Savonious rotor – Darrieus rotor – Horizontal axis wind turbine – Vertical axis wind turbine.

TEXT BOOKS:

1. "Non-conventional Energy Sources" by G.D Rai, Khanna Publishers.
2. "Renewable Energy Resources and emerging technologies"- PHI 2/e 2011 by D.P. Kothari, K.C Singal, R.Ranjan

REFERENCE BOOKS:

1. "Renewable Energy Resources", Twidell & Wier, CRC Press (Taylor &Francis)
2. "Fundamentals of Renewable Energy Systems", D.Mukherjee, S.Chakrabarti, New Age International.
3. "Introduction to renewable energy", Vaughn Nelson, CRC Press (Taylor &Francis)
4. "Non-conventional Energy Resources", ByB.H.Khan

18EE3105 – SPECIAL MACHINES

(Professional Elective - I)

B.Tech. EEE - III Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18EE2204 – Electrical Machines-I
18EE3103 – Electrical Machines-II

Course Objectives: Develop ability to

1. Impart knowledge on Construction, principle of operation and performance of synchronous reluctance motors.
2. Impart knowledge on the Construction, principle of operation, control and performance of stepping motors.
3. Impart knowledge on the Construction, principle of operation, control and performance of switched reluctance motors.
4. Impart knowledge on the Construction, principle of operation, control and performance of permanent magnet brushless D.C. motors.
5. Impart knowledge on the Construction, principle of operation and performance of permanent magnet synchronous motors.

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Describe construction, working principle and characteristics of Synchronous Reluctance Motor.
CO2. Understand the principle of operation of stepper motor.
CO3. Understand the principle of operation of switched reluctance motor.
CO4. Analyze the torque speed characteristics of Permanent Magnet Motors
CO5. Understand the principle of operation of Permanent magnet synchronous motor.

UNIT – I

Stepper Motors: Variable Reluctance (VR) stepper motor, Permanent Magnet Stepper motor, Hybrid Stepper motor, Other types of stepper motors. Windings in stepper motors, torque equation, characteristics of Stepper motor. Open-loop and closed-loop control of stepper motors. Comparison of stepper motors.

UNIT – II

Switched Reluctance Motors: Constructional features, Principle of operation, basics of SRM Analysis, constraints of pole Arc and Tooth arc, Torque equation and characteristics, power converter circuits, control of SRM, current regulators, sensor-less control of SRM.

UNIT – III

Permanent Magnet DC (PMDC) Motor: Construction, Principle of working, Torque equation and equivalent circuit, performance characteristics, types of PMDC motors**.**

Brushless Permanent Magnet DC (BLDC) Motor: Construction, classification of BLDC motors, electronic commutation, Principle of operation. Sensor less control of BLDC motor. Comparison of conventional DC motor and BLDC motor.

UNIT – IV

Permanent Magnet Synchronous Motor: Construction, Principle of operation, EMF Equation, Torque equation, Phasor diagram, Control of PMSM – (Only DSP based control and Transfer function model of PMSM drive).

Synchronous Reluctance Motor: Construction, working, phasor diagram and torque equation. Control of Synchronous reluctance motor.

UNIT – V

DC Servo Motors: Construction, Principle of operation, Characteristics of DC servo motor, transfer function of DC servo motor.

AC servo Motor: Construction and working, Torque-speed characteristics of servo motor, transfer function of AC servo motor.

TEXT BOOKS:

1. E.G. Janardanan, 'Special electrical machines', PHI learning Private Limited, Delhi, 2014
2. Miller, T.J.E. "Brushless Permanent Magnet and Reluctance Motor Drives", Clarendon Press, Oxford, 1989.

.

REFERENCE BOOKS:

1. "Special Electrical Machines" Venkataratnam K., CRC Press, 2009
2. "Switched Reluctance Motor Drives – Modeling, Simulation, Analysis, Design and Application", R.Krishnan,', CRC Press, New York, 2001.4.
3. "Stepping Motors and their Microprocessor Controls ", Kenjo, T., and Sugawara, A., Stepping Motors and their Microprocessor Controls, Oxford Science Publications, 1984.

18EE3106 – ELECTRICAL ENERGY CONSERVATION AND AUDITING

(Professional Elective - I)

B.Tech. EEE - III Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18EE2204 – Electrical Machines-I

Course Objectives: Develop ability to

1. Understand different basic terms related to Indian Energy Scenario and Energy Conservation Act.
2. Understand the principles of energy conservation, audit and management.
3. Understand efficient heat and electricity utilization, saving and recovery in different thermal and electrical system.
4. Understand different basic terms related to Energy economy, Financial Management and to understand the role of Energy Service Companies.

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Perform energy accounting and balancing.
CO2. Prepare energy audit report for different energy conservation instances.
CO3. Suggest energy saving methodologies.
CO4. Evaluate the energy saving and conservation in different electrical utilities.

UNIT – I

Energy Scenario, Conservation Act and related policies: Energy Scenario of India. Present Nonrenewable Energy Scenario, Present Energy Consumption, Energy security, Energy strategy for the future.

UNIT – II

Energy Audit: Definition of Energy Audit, Types of Energy Audit, Energy Audit methodology – Audit preparation, Execution, Reporting.

Survey Instrumentation: Electrical Measurement, Thermal Measurement, Light measurement, Speed Measurement, Data logger and data acquisition.

UNIT – III

Electrical- Load Management: Load management techniques, Use of Storage systems, Decentralized power generation, Reduce electricity use during peak hours, use of demand controllers, Variable frequency drive, Harmonics and its effects, Electricity tariff, Power factor – penalty and rebate.

UNIT – IV

Energy Audit of Motors: Classificication of Motors, Parameters related to motors, efficiency of a motor, Energy conservation in Motors, selection of right motor, Assessing Motor and drive-system operating conditions, optimization of complete system, BEE Star rating and labeling.

UNIT – V

Financial Analysis: Simple Payback, Return on Investment, net present value and internal rate of return, life cycle cost method, Sensitivity analysis, Project-financing options, Energy monitoring and targeting.

TEXT BOOKS:

1. Sonal Desai "Handbook of Energy Audit" McGraw Hill. 2018
2. W.C. Turner "Energy Management Handbook" John Wiley and Sons, A Wiley Inter-science publication.

REFERENCE BOOKS:

1. "Handbook of Energy Audits", Albert Thumann, 6th Edition, The Fairmont Press
2. "Bureau of Energy Efficiency", Vol No.1, 2, 3 4
3. "Energy Management", W.R. Murphy and G. Mckay, Butter Worth Publications
4. "Energy Manager Training Manual", (4 Volumes) available at https://beeindia.gov.in administered by Bureau of Energy Efficiency (BEE), a statutory body under Ministry of Power, Government of India, 2004

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EE3107-SMART GRID / MICRO GRID
(Professional Elective - I)

B.Tech. EEE - III Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18EE2202 – Power Systems – I
18EE3101 – Power Systems –II
18EE3103 – Control Systems
18EE3201 – Power Electronics

Course Objectives: Develop ability to
1. Understand the basic concepts of Smart grid
2. Communicate effectively through Smart meters.
3. Integrate renewable energy generation to smart grids.
4. Understand the concept of Micro Grid.
5. Understand the Power Quality associated with Micro Grids.

Course Outcomes (COs): At the end of the course, student would be able to
CO1: Do Power Flow calculations and explain functions of smart grid components
CO2: Use Smart meters for effective power network communication
CO3: Integrate Renewable energy generation with smart grids.
CO4: Operate, communicate and control Micro grids.
CO5: Analyze the stability of micro grids under different power quality events.

UNIT – I
Introduction to Smart Grid: Smart Grid - definition, Applications, Government and Industry - Standardization, Functions of Smart Grid Components, Wholesale energy market in smart grid, smart vehicles in smart Grid.

UNIT – II
Smart Grid Communications and Measurement Technology: Communication and Measurement – Monitoring Phasor Measurement Unit (PMU), Smart Meters, Wide area monitoring systems (WAMS), Advanced metering infrastructure – GIS and Google Mapping Tools, IP – based systems, Network Architectures.

UNIT – III
Renewable Energy and Storage: Renewable Energy Resources – Sustainable Energy Options for the Smart Grid – Penetration and Variability Issues associated with sustainable energy technology – Demand response issues – Electric Vehicles and Plug in Hybrids – PHEV Technology – Environmental Implications – Storage Technologies – Grid integration issues of renewable energy sources.

UNIT – IV
Micro grids: Concept and definition of micro grid, micro grid drives and benefits, review of sources of micro grids, power electronics interfaces in DC and AC micro grids, Communication infrastructure.

Modes of operation and control of micro grid: Grid connected and islanded mode, Active and reactive power control, protection issues, anti-islanding schemes: passive, active and communication based techniques.

UNIT – V

Power Quality Issues in Micro Grids: Power quality issues in micro grids: Modeling and stability analysis of micro grid, regulatory standards, micro grid economics, introduction to smart micro grids.

TEXT BOOKS:

1. ”Smart Grid: Fundamentals of design and analysis”, James Momoh, John Wiley & Sons Inc, IEEE press 2012.
2. “Smart grid: Technology and applications”, Janaka Ekanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, John Wiley U sons inc, 2012

REFERENCE BOOKS:

1. “Smart Grid: Integrating Renewable, Distributed & Efficient Energy”, Fereidoon P Sioshansi, Academic press, 2012.
2. “The Smart grid: Enabling energy efficiency and demand response”, Clark W Gellings, Fairmont press inc, 2009.

18EE3108 - COMPUTER METHODS IN POWER SYSTEMS

(Professional Elective - II)

B.Tech. EEE - III Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):18EE2202 – Power Systems – I
18EE2103 – Electrical Circuits

Course Objectives: Develop ability to

1. Understand Single line diagram and per unit quantity representation of Power systems
2. Study Symmetrical components and various faults in power systems
3. Formulate various Network Matrices in power systems
4. Know the importance of load flow studies and analysis by various load flow methods.
5. Analyze steady state stability and transient state stability.

Course Outcomes (COs): At the end of this course, students would be able to

CO1. Perform a wide-variety of per-unit conversions and fault analysis
CO2. Analyze short circuit studies for the protection of power system
CO3. Develop Y_{bus} and Z_{bus} matrices.
CO4. Analyze load flow for various requirements of the power system.
CO5. Estimate stability and instability in power systems

UNIT – I

Single line diagram: Impedance diagram and Reactance diagram.

Per-Unit System of Representation: Per-Unit quantities- changing the base of per unit quantities, equivalent reactance network of a three phase Power System, Numerical Problems.

Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Numerical Problems.

UNIT – II

Symmetrical Component Theory: Symmetrical Component Transformation, Positive, Negative and Zero sequence components: Voltages, Currents and Impedances, Numerical Problems. Sequence Networks for Alternator and 3 phase transformer.

Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without fault impedance, Numerical Problems.

UNIT – III

Power System Network Matrices: Bus Incidence Matrix, Y bus formation by Direct and Singular Transformation Methods, Numerical Problems.

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)

UNIT – IV

Power flow Studies: 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, (Sample One Iteration only)
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. Comparison of Gauss Seidel and Newton Raphson Methods.

UNIT – V

Power System Stability Analysis: Elementary concepts of Steady State, Dynamic and Transient Stabilities. Rotor dynamics and Swing equation (Derivations and Numerical Problems). Power Angle Curve and Determination of Steady State Stability by change in load angle.
Determination of Transient Stability by Equal Area Criterion by change in mechanical input, Application of Equal Area Criterion, Critical Clearing Angle - Solution of Swing Equation: Point-by-Point Method. Factors effecting and Methods to improve steady state and transient Stabilities.

TEXT BOOKS:

1. "Power System Analysis", Grainger and Stevenson, Tata McGraw Hill.
2. "Computer methods in Power System Analysis", Stagg and El –Abiad, Mc graw Hill.

REFERENCE BOOKS:

1. "Power system Analysis and design", Dr.B.R Gupta, S.Chand publishers.
2. "Modern Power system Analysis", I.J.Nagrath & D.P.Kothari, Tata McGraw-Hill Publishing company, 2nd edition.
3. "Computer techniques and models in power systems", K.Uma rao, I.K.International
4. "Power System Analysis", Hadi Saadat, TMH Edition.

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Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EE3109 – ELECTRICAL ESTIMATION AND COSTING
(Professional Elective - II)

B.Tech. EEE - III Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18EE2202 Power Systems – I

Course Objectives: Develop ability to
1. Understand the general principles of estimation and costing.
2. Prepare estimates for electrification of residential buildings
3. Prepare estimates for electrification of Commercial installations.
4. Understand the costing factors involved in installation of overhead transmission and distribution lines.
5. Understand the costing factors involved in installation design and estimation of substations.

Course Outcomes (COs): At the end of the course, student would be able to
CO1. Determine the factors involved in general aspects of costing and estimation.
CO2. Assess the factors involved in costing and estimation of residential buildings.
CO3. Assess the factors involved in costing and estimation of commercial installations.
CO4. Understand the components required in the installation of overhead transmission and distribution lines.
CO5. Understand the components required in the installation of substations

UNIT – I

General principles of estimation: Introduction to estimation & costing, Electrical Schedule. Market Survey and source selection. Recording of estimates, Determination of required quantity of material, Labor conditions. Determination of cost material and labor Contingencies. Overhead charges, Profit, Purchase system, Purchase enquiry and selection of appropriate purchase mode. Comparative statement, Purchase orders., Indian Electricity Act-Introduction only

UNIT – II

Residential building electrification: General guidelines for wiring of residential installation and positioning of equipment. Load calculations and selection of size of conductor, wires and cables. Selection of rating of main switch Distribution board, protective switchgear ELCB and MCB and wiring accessories, Earthing. Preparation of detailed estimates and costing of residential installation.

UNIT – III

Electrification of commercial installation: Concept of commercial installation, Difference between electrification of residential and commercial installation, Fundamental considerations for commercial building, Load calculation and selection of size of service connection and nature of supply, sizing of the cables, bus bar and bus bar chambers, Earthing. Sequence to be followed to prepare estimate, Preparation of detailed estimate and costing of commercial installation.

UNIT – IV

Design and estimation of overhead transmission & distribution lines: Main components of overhead lines. Factors governing height of pole, Determination of size of conductor for overhead transmission line, Cross arms, Pole brackets and clamps, Guys and Stays, Lightning Arrestors, Phase plates, Danger

plates, Anti climbing devices, Bird guards, Beads of jumpers. Testing and commissioning of overhead distribution lines.

UNIT – V

Design and estimation of substations: Introduction, Classification of substation, Indoor substations, Outdoor substations, Selection and location of site for substation, Equipment for substation and switchgear installations, Substation auxiliaries supply, Substation Earthing.

TEXT BOOKS:

1. “Residential Commercial and Industrial Systems”, H. Joshi, McGraw Hill Education, 2008
2. "Electrical Installation Estimating & Costing", J.B.Gupta, S.K.Katria & Sons New Delhi

REFERENCE BOOKS:

1. "Electrical Design Estimating and Costing", K.B.Raina, S.K.Bhattacharya, New Age International
2. "Electrical Wiring Estimating and Costing", S.L.Uppal, G. C. Garg, Khanna Publishers Delhi

18EE3110 – INDUSTRIAL ELECTRICAL SYSTEMS

(Professional Elective - II)

B.Tech. EEE - III Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18EE2103 – Electrical Circuits
18EE2203 – Network Theory
18EE2202 – Power Systems - I

Course Objectives: Develop ability to

1. To understand different components in electrical system.
2. Become aware of different residential and commercial electrical systems.
3. To know about different Illumination systems
4. To understand various industrial electrical systems.

Course Outcomes (COs): At the end of this course, students would be able to

CO1. Understand the electrical wiring systems for residential, commercial and industrial consumers
CO2. Representing the systems with standard symbols, drawings and single line diagrams.
CO3. Understand the working of various components of industrial electrical systems.
CO4. Analyze and select the proper size of electrical system components.

UNIT – I

Electrical System Components: LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, Single Line Diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices

UNIT – II

Residential and Commercial electrical systems: Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing of components.

UNIT – III

Illumination Systems: Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premises, flood lighting.

UNIT – IV

Industrial Electrical Systems – I: HT connection, industrial substation, Transformer selection, Industrial loads, motors, starting of motors, SLD, Cable and Switchgear selection, Lightning Protection, Earthing design, Power factor correction – kVAR calculations, type of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components.

UNIT - V

Industrial Electrical Systems – II: DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks.

TEXT BOOKS:

1. "Electrical Wiring, Estimating & costing", S. L. Uppal and G. C. Garg, Khanna publishers, 2008.
2. "Electrical Design, Estimating & Costing", K. B. Raina, New age International, 2007.

REFERENCE BOOKS:

1. "Electrical estimating and costing", S. Singh and R. D. Singh, Dhanpat Rai and Co., 1997.
2. "Residential Commercial and Industrial Systems", H. Joshi, McGraw Hill Education, 2008
3. Web site for IS Standards.

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Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18CS3109 – COMPUTER ORGANIZATION
(Professional Elective - II)

B.Tech. EEE - III Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18EC2102 –Digital Design

Course Objectives: Develop ability to:

1. Understand computer components in general and in particular Von Neumann Architecture and their functionalities.
2. Understand the data representation (2's complement, floating point) inside the processor, and perform arithmetic operations on them.
3. Understand the rationale behind memory organization, storage, I/O, and know how cache operates.
4. Understand 8086 processor architecture and its organization: pin diagram, different types of registers, addressing modes and data transfer.
5. Illustrate computer organization concepts by Assembly Language programming, structure of assembly language program and function call mechanisms.

Course Outcomes (COs): At the end of the course, student would be able to

CO1: Explain various computer abstract levels and functions of computer hardware components and concept of stored program organization.
CO2: Identify different hardware components associated with the memory organization of a computer.
CO3: Recommend instruction formats, addressing modes, interrupts, I/O and Memory buses, Isolated and Memory mapped I/O.
CO4: Recommend mode of asynchronous serial data transfer using an interface (UART).
CO5: Design and implement simple systems using 8086 processor with the knowledge of pin diagram, registers and instruction formats of 8086 processor by writing assembly language programs.

UNIT – I

Basic Computer Organization – Functions of CPU, I/O Units, Memory, Instruction Formats- one address, two addresses, zero addresses and three addresses and comparison; addressing modes with numeric examples; Program Control- Status bit conditions, conditional branch instructions, Program Interrupts: Types of Interrupts.

UNIT – II

Input-Output Organizations- I/O Interface, I/O Bus and Interface Modules: I/O Vs Memory Bus, Isolated Vs Memory-Mapped I/O, Asynchronous Data Transfer- Strobe Control, Hand Shaking; Asynchronous Serial Transfer- Asynchronous Communication Interface, Modes of Transfer- Programmed I/O, Interrupt Initiated I/O, DMA; DMA Controller, DMA Transfer, IOP- CPU-IOP Communication, Intel 8089 IOP.

UNIT – III

Memory Organizations: Memory Hierarchy, Main Memory, RAM, ROM Chips, Memory Address Map, Memory Connection to CPU, Associate Memory.

Cache Memory, Data Cache, Instruction Cache, Miss and Hit Ratio, Access Time, Associative Mapping, Set-Associative Mapping, Writing into Cache, Introduction to Virtual Memory.

UNIT – IV

8086 CPU Pin Diagram- Special Functions of General Purpose Registers, Segment Register, Concept of Pipelining, 8086 Flag Register, Addressing Modes of 8086.

UNIT – V

8086 Instruction Formats: Assembly Language Programs involving Branch & Call Instructions, Sorting, Evaluation of Arithmetic Expressions.

TEXT BOOKS:

1. "Computer System Architecture", M. Morris Mano, 3/e, Pearson Education.
2. "Advanced Micro Processor and Peripherals", Hall/A K Ray, McGraw Hill Education, 2006.

REFERENCE BOOKS:

1. "Computer Organization and Architecture", William Stallings, Sixth Edition, Pearson/PHI.
2. "Structured Computer Organization", Andrew S Tanenbaum, 4th Edition, PHI/Pearson.
3. "Fundamentals of Computer Organization and Design", Sivaraama Dandamudi, Springer Int. Edition.
4. "Computer Architecture a Quantitative Approach", John L. Hennessy and David A. Patterson, 4th Edition, Elsevier.
5. "Computer Architecture: Fundamentals and Principles of Computer Design", SJoseph D. Dumas II, BS Publication

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Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EE31L1 – POWER SYSTEMS - II LAB

B.Tech. EEE - III Year I Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s):18EE2202 – Power Systems - I
18EE2204 – Electrical Machines-I

Course objectives: Develop ability to

1. Determine equivalent circuit parameters of 3-winding transformer.
2. Find sub -transient reactance of a salient polo synchronous machine and three phase transformer.
3. Calculate Fault current for various fault analysis
4. Apply iterative techniques to typical power systems
5. Understand the behavior of DC distribution systems and determine Voltage stability in power systems.

Course Outcomes (COs): At the end of the course, students would be able to

CO1. Draw the equivalent circuit of 3 -winding transformer
CO2. Review sequence impedances of salient pole synchronous machine and 3-ph Transformer.
CO3. Apply Fault calculations for various faults in power systems.
CO4. Apply iterative techniques to typical power systems using Gauss Siedel method.
CO5. Understand the behavior of DC distribution systems and voltage stability problems in power systems.

LIST OF EXPERIMENTS:

PART-A

1. Determination of Equivalent circuit parameters of 3-winding transformer.
2. Determination of Sequence impedance of salient pole synchronous machine
3. Fault analysis-I
   i. Single line to ground fault (L-G)
   ii. Line to Line fault (L-L)
4. Fault analysis-II
   i. Double line to Ground fault (L-L-G)
5. Determination of Sequence Impedance of Three Phase Transformer.

PART-B

Simulation studies of the following

6. Solution of power flow using Gauss Siedel method.
7. ABCD constants for long lines and voltage profile observation for open circuit line with and without shunt reactor compensation.
8. The performance of power system stabilizer
9. Steady state stability for small disturbances with and without change in power Input.
10. Voltage stability problems in transmission lines

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EE31L2 – ELECTRICAL MACHINES – II LAB

B.Tech. EEE - III Year I Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): 18EE22L3 – Electrical Machines – I LAB

Course Objectives: Develop ability to

1. Understand performing a experiment on three – phase induction motor to analyze its characteristics by direct and indirect tests.
2. Determine equivalent circuit parameters of a single – phase and three-phase induction motors.
3. Examine the performance of single phase induction motor by load test.
4. Determine Regulation of alternator by different methods.
5. Understand determination of $\mathbf{X_d}$, $\mathbf{X_q}$ and sequence impedance of a synchronous machine.
6. Draw **'V'** and **'Inverted V'** curves of a three-phase synchronous motor.

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Draw performance characteristics of a three phase induction motor.
CO2. Calculate equivalent circuit parameters of a single – phase and three-phase induction motors.
CO3. Analyze performance of single phase induction motor.
CO4. Distinguish Regulation of three phase alternator by different methods.
CO5. Evaluate $\mathbf{X_d}$, $\mathbf{X_q}$ and sequence impedance of a synchronous machine.
CO6. Improve power factor of synchronous motor by varying excitation.

LIST OF EXPERIMENTS:

1. Brake test on three-phase induction motor.
2. No-load and blocked rotor tests on three-phase induction motor.
3. Equivalent circuit parameters of a single-phase induction motor.
4. Equivalent circuit parameters of a three-phase induction motor
5. Brake test on single phase induction motor.
6. Regulation of a three-phase alternator by synchronous impedance & **MMF** methods.
7. Regulation of a three-phase alternator by **ZPF** & **ASA** methods.
8. Determination of $\mathbf{X_d}$ and $\mathbf{X_q}$ of a salient pole synchronous machine.
9. **'V'** and **'Inverted V'** curves of a three-phase synchronous motor.
10. Efficiency of three-phase alternator.

18EE31L3–CONTROL SYSTEMSLAB

B.Tech. EEE - III Year I Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s):18EE21L1 – Field Theory and Circuits Lab

Course Objectives: Develop ability to

1. Understand the concepts of time response analysis.
2. Understand the effect of controllers and compensators in the context of a second order system response.
3. Understand the control aspects in applications like synchros, DC motor and AC motor
4. Understand stability analysis and state space representation of a system

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Determine the time domain specifications for a given system.
CO2. Draw the characteristics of synchro transmitter and receiver.
CO3. Determine the Transfer Function of DCmotor.
CO4. Analyze the effect of P, PI, PD, PID controller DC servomotor
CO5. Determine the Transfer Function of DC generator.
CO6. Evaluate the gain margin and phase margin of a given system using lag and lead compensators.
CO7. Measure the temperature using different controllers.
CO8. Draw the characteristics of AC servomotor
CO9. Simulate the stability analysis of a Linear Time Invariant system
CO10. Simulate a state space model for a given classical transfer function

LISTOFEXPERIMENTS:

1. Time response of second order system
2. Characteristics of synchros
3. Transfer function of DC shunt motor
4. Effect of P, PI, PD, PID controller on a second order system (DC servomotor)
5. Lag and Lead Compensation-magnitude and phase plot
6. Transfer function of DC Generator
7. Temperature controller using P, I, D controllers
8. Characteristics of AC servomotor.
9. Simulation of root locus, bode plot and Nyqusit plot for a Linear Time Invariant System and perform stability analysis.
10. Simulation of State space model for a classical transfer function.

Note:
All simulation experiments will be simulated using suitable software.

B.Tech (EEE)
III Year II Sem.
Detailed Syllabus

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EE3201 – POWER ELECTRONCS

B.Tech. EEE - III Year II Sem.

L	T	P/D	C
3	1	-/-	4

Pre requisites: 18PH1201- Semiconductor devices

Course Objectives: Develop ability to

1. Understand characteristics and operation of power semiconductor devices
2. Understand phase angle control and converter configurations for conversion of AC power to DC power
3. Understand types of chopper circuits for DC to DC power conversion
4. Understand the concepts of AC to AC power conversion
5. Understand single phase and three phase inverters operation

Course Outcomes (COs): At the end of the course the student would be able to

CO1. Identify different power semiconductor devices required for power electronic converters
CO2. Attain knowledge about single phase and three phase converter configurations for AC to DC power conversion.
CO3. Attain knowledge about converter configurations for DC to DC power conversion
CO4. Attain knowledge of AC voltage and frequency conversion circuit configurations
CO5. Attain knowledge of single phase and three phase converter configurations for DC to AC power conversion

UNIT – I

Introduction to power semiconductor devices (switches): Introduction to power electronics - Ideal switch characteristics and ratings – Study of Diode, BJT, MOSFET, IGBT, Thyristors (SCR): Basic operation, switching operation, output characteristics – SCR:Two transistor analogy, Series and parallel operation, Turn ON and turn OFF methods, Gate triggering circuits (operation only), Snubber circuits, Numericals.

UNIT – II

Phase controlled rectifiers: Concept of controlled and uncontrolled rectifiers -Phase angle control technique – Concept of commutation – Single phase half wave and full wave controlled rectifiers - Single phase half and fully controlled rectifiers with R, RL and RLE loads (bridge and mid-point configuration) – Three phase half and fully controlled rectifiers with R, RL and RLE loads – Derivation of load voltage and current expressions - Output waveforms, Numericals - Effect of source inductance– Dual converters: Single phase and three phase (operation only).

UNIT – III

DC Choppers: Choppers – Control strategies – Step down, step up and step up/down choppers- Derivation of load voltage and current expressions with R, RL and RLE loads, Waveforms, Numericals, Introduction to chopper based motor control.

UNIT – IV

AC- AC converters: Single phase AC voltage controllers: Thyristor and TRIAC based, R and RL loads,

Derivation of RMS load voltage expression, Waveforms, Numericals –Single phase cyclo-converters: Mid-point configuration, Step up and step down, R and RL load (Principle of operation only)

UNIT – V

Inverters: Single phase half and full bridge and three phase VSI and CSI: Operation with R and RL loads, Waveforms, Derivation of output voltage expressions - Voltage control techniques for inverters- Pulse width modulation techniques – Numericals, Applications of power electronic converters (with block diagrams).

TEXT BOOKS:

1. Power Electronics by P.S.Bhimbra, Khanna Publishers.
2. Power Electronics by M.D.Singh & K.B.Kanchandhani, Tata Mc Graw Hill Publishing Company, 1998.

REFERENCE BOOKS:

1. Power Electronics – by Vedam Subramanyam, New Age International (P) Limited, Publishers
2. Power Electronics - by V.Ramoorthy , 1 edition -2005, OXFORD University Press
3. Power Electronics-by P.C.Sen,Tata Mc Graw-Hill Publishing.
4. Thyristorised Power Controllers – by G. K. Dubey, S. R. Doradra, A. Joshi and R. M. K. Sinha, New Age International (P) Limited Publishers, 1996.
5. Power Electronics: Circuits, Devices and Applications– by M.H.Rashid, Prentice Hall of India, 2nd edition, 1998

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18EC3208- ANALOG CIRCUITS

B.Tech. EEE - III Year II Sem.

L	T	P/D	C
3	1	-/-	4

Prerequisite(s): 18PH1201- Semiconductor Devices

Course Objectives: Develop ability to

1. Understand analysis of single amplifiers in mid, low and high frequency regions, for BJT and FETs.
2. Understand analysis of multistage BJT amplifiers in mid frequency region.
3. Understand the concept of feedback in an amplifiers and analysis of various feedback amplifiers.
4. Understand the concept of positive feedback in oscillators, analyze and realize R-C, L-C oscillators.
5. Understand large signal amplifiers - Class A, Class B and their power conversion efficiency.

Course Outcomes (COs): At the end of the course, the student would be able to

CO 1. Analyze single stage amplifiers at mid-band, low frequency and high frequency regions.
CO 2. Analyze multistage BJT amplifiers in mid frequency region.
CO 3. Analyze different types of feedback amplifiers using transistors.
CO 4. Design and analyze different types of oscillators using transistors.
CO 5. Explain different types of power amplifiers and compare them in terms of efficiency.

UNIT – I

Single Stage Amplifiers: Small signal h-parameter model of BJT, Mid-band analysis of Single stage CE amplifier. Effect of coupling and bypass capacitors on the gain of an amplifier. The Hybrid- pi Common Emitter Transistor Model and its analysis, FET low and high frequency models and its analysis. Design of Single stage BJT and FET amplifiers for given specifications.

UNIT – II

Multistage Amplifiers: Cascading of amplifiers and its corresponding frequency response under various coupling methods. Analysis of two-stage RC coupled CE amplifier. Cascade Amplifier and Darlington Pair.

UNIT – III

Feedback Amplifiers: Concept of Feedback, Classification of Feedback Amplifiers, Effect of Feedback on Amplifier characteristics. Analysis of Voltage – Series, Voltage-Shunt, Current-Series and Current-Shunt Configurations.

UNIT – IV

Oscillators: Classification of Oscillators. Conditions for Oscillations. Analysis and design of RC Phase shift oscillators (using BJT and FET). Analysis of Wien–Bridge oscillator. Analysis and design of LC oscillators. Applications of Crystal Oscillator. Stability of Oscillators.

UNIT – V

Large Signal Amplifiers: Classification of power amplifiers, Class-A Large Signal Amplifiers, Conversion Efficiency of Class-A power Amplifier, Design of Transformer Coupled Class-A Audio Power Amplifier, Conversion Efficiency of Class-B push-pull power Amplifier, Class B power amplifier using Complementary Symmetry.

TEXT BOOKS:

1. "Electronic Devices and Circuits", J. Millman, C.C.Halkias, and Satyabrata Jit, 2nd Edition., 1998, TMH.
2. "Electronic Circuits: Discrete and Integrated", Donald L.Schilling and Charle Belove, TMH.

REFERENCE BOOKS:

1. "Integrated Electronics", Jacob Millman and Christos C Halkias,1991 Ed., 2008, TMH
2. "Electronic Devices and Circuits", R.L. Boylestad and Louis Nashelsky, 9th Edition, 2006, PHI

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18MB3201-MANAGEMENT FUNDAMENTALS

B.Tech. EEE - III Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None

Course Objectives: Develop ability to
1. Understand the Management Concepts,
2. Applications of Concepts in Practical aspects of business
3. Develop Managerial Skills.

Course Outcomes (COs): At the end of the course, student would be able to
CO 1: Explain the significance of Management in his/her Profession.
CO 2: Explain various Management Functions like Planning and Decision Making.
CO 3: Explain Organizing, Staffing, Human Resource Management and Business Strategy
CO 4: Explain different types of leaderships and Motivation
CO 5: Explain Leading, Motivation and Control aspects

UNIT – I

Introduction to Management: Definition, Nature and Scope, Functions, Managerial Roles, Levels of Management, Managerial Skills, Challenges of Management; Evolution of Management- Classical Approach- Scientific and Administrative Management; The Behavioral approach; The Quantitative approach; The Systems Approach; Contingency Approach, IT Approach.

UNIT – II

Planning and Decision Making: General Framework for Planning - Planning Process, Types of Plans, Management by Objectives; Development of Business Strategy. Decision making and Problem Solving - Programmed and Non Programmed Decisions, Steps in Problem Solving and Decision Making; Bounded Rationality and Influences on Decision Making; Group Problem Solving and Decision Making, Creativity and Innovation in Managerial Work.

UNIT – III

Organization and HRM: Principles of Organization: Organizational Design & Organizational Structures; Departmentalization, Delegation; Empowerment, Centralization, Decentralization, Recentralization; Organizational Culture; Organizational Climate and Organizational Change. Human Resource Management & Business Strategy: Talent Management, Talent Management Models and Strategic Human Resource Planning; Recruitment and Selection; Training and Development; Performance Appraisal.

UNIT – IV

Leading and Motivation: Leadership, Power and Authority, Leadership Styles; Behavioral Leadership, Situational Leadership, Leadership Skills, Leader as Mentor and Coach, Leadership during adversity and Crisis; Handling Employee and Customer Complaints, Team All Leadership.

Motivation - Types of Motivation; Relationship between Motivation, Performance and Engagement, Content Motivational Theories - Needs Hierarchy Theory, Two Factor Theory, Theory X and Theory Y.

UNIT – V

Controlling: Control, Types and Strategies for Control, Steps in Control Process, Budgetary and Non-Budgetary Controls. Characteristics of Effective Controls, Establishing control systems, Control frequency and Methods.

TEXT BOOKS:

1. "Management Fundamentals", Robert N Lussier, 5e, Cengage Learning, 2013.
2. "Fundamentals of Management", Stephen P. Robbins, Pearson Education, 2009.

REFERENCES BOOKS:

1. "Essentials of Management", Koontz Kleihrich, Tata McGraw Hill.
2. "Management Essentials", Andrew DuBrin, 9e, Cengage Learning, 2012

18EE3202 – POWER SYSTEM OPERATION AND CONTROL

(Professional Elective - III)

B.Tech. EEE - III Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):18EE2202 – Power Systems-I
18EE3101 – Power Systems-II

Course Objectives: Develop ability to

1. Know the importance of frequency control
2. Analyze different methods to control reactive power
3. Understand unit commitment problem and importance of economic load dispatch
4. Understand real time control of power systems

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Analyze the optimal scheduling of power plants
CO2. Analyze the steady state behavior of the power system for voltage and frequency fluctuations
CO3. Describe reactive power control of a power system
CO4. Design suitable controller to dampen the frequency and voltage steady state oscillations.

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.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

18EE3203 CONTROL SYSTEMS DESIGN

(Professional Elective III)

B.Tech. EEE - III Year II Sem.

L	T	P/D	C
3	-	-/-	3

Pre requisites: 18MA1101 – Mathematics - I
18EE3103 – Control Systems

Course Objectives: Develop ability to

1. Design compensators to reduce steady state error and improve transient response
2. Design using frequency domain and time domain techniques.
3. Design in state space
4. Implement the techniques to practical applications

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Identify time domain and frequency domain techniques to design stable systems
CO2. Improve the steady state and transient response of system using compensators and controllers.
CO3. Design stable systems using root locus and frequency plots
CO4. Design controllers using state space technique
CO5. Implement the design techniques to applications

UNIT – I

Review of Control system design methods: Review -First and second order systems – Time domain analysis – Frequency domain analysis – State space analysis

UNIT – II

Design by Root locus method: – Introduction – Improving steady state error and transient response via cascade compensation – Pole Placement - Feedback compensation – Physical realization of compensation

UNIT-III

Design by Frequency response: – Introduction – Transient response via gain adjustment – Lag compensation – Lead compensation – Lag-lead compensation

UNIT – IV

Design by State Space: – Introduction – Controller design – Controllability – Alternative approaches to controller design – observer design – Observability - Alternative approaches to observer design- Steady state error design via integral control

UNIT – V

Case Study: Disk drive system – Traction drive control system – Automobile Engine control

TEXT BOOKS:

1. "Control Systems Engineering", 4th Edition, Norman Nise, John Wiley and sons
2. "Modern Control Engineering", 9th Edition, Katsuhiko Ogata, Pearson Education Inc.

REFERENCE BOOKS:

1. "Modern Control Systems", 12th Edition, Richard Dorf, Robert.H.Bishop, Prentice Hall.
2. "Control Systems: Principles and Design", Fourth Edition, M.Gopal, Tata McGrawHill.
3. "Design of Feedback control systems", 4th Edition, Stefani, Shahian, Savant, Hostettter, Oxford University Press.

18EE3204- ELECTRICAL AND HYBRID VEHICLES

(Professional Elective-III)

B.Tech. EEE - III Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18PH1102 – Applied Physics
18EE3102 – Electrical Machines-II
18EE3103 – Control Systems

Course Objectives: Develop ability to

1. Understand the concepts and drive train configurations of electric drive vehicles
2. Build different electric propulsion systems
3. Understand various energy storage devices
4. Understand control of hybrid electric vehicles
5. Propose advanced battery charger topologiesfor plug in hybrid electric vehicles

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Know the concepts and drivetrain configurations of electric drivevehicles
CO2. Interpret different electric propulsion systems
CO3. Differentiate variousenergy storagedevices
CO4. Understand control strategiesof hybrid electricvehicles
CO5. Identify battery charger topologies for plug in hybrid electricvehicles

UNIT – I

Introduction to Electric Vehicles: Sustainable Transportation - EV System - EV Advantages - Performance of EVs - Electric Vehicle drivetrain - EV Transmission Configurations and components - Energy Consumption - EV Market - Types of Electric Vehicle in Use Today

UNIT – II

Electric Vehicle Modeling - Transmission Efficiency - Consideration of Vehicle Mass - Tractive Effort - Modeling Vehicle Acceleration - Modeling Aero dynamic Considerations- Idea lGear box Steady State Model-EV Motor Sizing- General Issues in Design.

UNIT – III

Introduction to electric vehicle batteries, battery efficiency, battery capacity, battery charging and fast charging, battery discharging, battery performance and testing.

UNIT – IV

Hybrid Electric Vehicles - HEV Fundamentals -Architectures of HEVs- Interdisciplinary Nature of HEVs- Advantages and Disadvantages - Challenges and Key Technology of HEVs - Concept of Hybridization of the Automobile-Plug-in Hybrid Electric Vehicles Control- Fuel Cell Hybrid Electric Drive Train Design - HEV Applications.

UNIT – V

Advanced topics: Battery Charger Topologies, Charging Power Levels, and Infrastructure for Plug - in Electric and Hybrid Vehicles - Sizing Ultra capacitors for Hybrid Electric Vehicles.

TEXT BOOKS:

1. "Modern Electric, Hybrid Electric and Fuel Cell Vehicles – Fundamentals, Theory and Design", Mehrdad Ehsani, Uimin Gao and Ali Emadi - Second Edition - CRC Press, 2010.
2. "Electric & Hybrid Vehicles – Design Fundamentals", Iqbal Hussain, Second Edition, CRC Press,2011.

REFERENCE BOOKS:

1. "Hybrid electric Vehicles Principles and applications With practical perspectives", Chris Mi, Dearborn - M. Abul Masrur, David Wenzhong Gao, A John Wiley &Sons, Ltd., -2011.
2. "Electric Vehicle Technology Explained", James Larminie, John Lowry - John Wiley & Sons Ltd, - 2003.
3. "ElectricVehicleBatterySystems", Sandeep Dhameja, Newnes, NewDelhi, 2002.
4. "The Impact of Plug-in Hybrid Electric Vehicles on Distribution Networks: a Review and Outlook", Robert C. Green II, Ling feng Wang and Mansoor Alam, 2010 IEEE.
5. "Sizing Ultra capacitors for Hybrid Electric Vehicles", H.DouglasPPillay-2005IEEE.
6. "Review of Battery Charger Topologies, Charging Power Levels, and Infrastructure for Plug-In Electric and Hybrid Vehicles", Murat Yilmaz, and Philip T. Krein, IEEE transactions on power electronics, vol. 28, no. 5, May2013.

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18EE3205 – ROBOTICS
(Professional Elective –III)

B.Tech. EEE - III Year II Sem.

L	T	P/D	C
3	-	-/-	3

Pre requisites: 18EE2204 Electrical Machines-I
18EE3103 Control Systems

Course Objectives: Develop ability to
1. Demonstrate knowledge about robotics.
2. Understand the functioning of robotics.
3. Understand the functioning of electric drives for robotics.
4. Understand the concepts related to electric actuators.
5. Understand the characteristics of motors used for robotics.

Course Outcomes (COs): At the end of the course, student will be able to
CO1. Attain knowledge about the background and basics of robotics.
CO2. Attain knowledge about actuators and drives required for robots.
CO3. Attain knowledge about sensors required for robots
CO4. Attain knowledge about motion control in a robot
CO5. Study structure of some existing robots.

UNIT – I
Introduction to Robotics: Introduction and history of robots – Components of a robot - Degrees of freedom-Joints- Coordinates and reference frames-Programming modes-characteristics-Workspace-Languages and applications.

UNIT - II
Electric Actuators and Drive Systems: Introduction to Actuators and drive systems – Characteristics and comparison of actuating systems - Electro-Mechanical System dynamics - Robot Actuation and Control- Electric Motors: different types of servo and stepper motors for Robotic applications.

UNIT – III
Sensors and Encoders in Robots: Types of sensors and their characteristics - Position sensors, Velocity sensors, Acceleration sensors, Force and Pressure sensors, Torque sensors, Micro Switches, Visible Light and Infrared Sensors, Proximity sensors – Encoders.

UNIT – IV
Motion Control Systems: Basic Components and terminology- Block diagrams and transfer function - Controllers and compensators- Open loop Vs Closed loop applications -Typical digital control system – Automatic control of Electric Motors.

UNIT – V
Case Study: Control of the PUMA Arm. Single Joint Arm: Transfer function, Positional Controller for a single joint, performance and stability criteria – Natraj: A case study of 6 legged robot.

TEXT BOOKS:

1. "Introduction to Robotics – Analysis, Control, Applications", Saeed B. Niku.Wiley II Edition. 2014.
2. "Robotics and Control", R. K. Mittal, I J Nagrath McGraw Hill Publication 2015

REFERENCE BOOKS:

1. "Robotics –Control, Sensing, Vision and Intelligence", K.S. Fu, R.C. Gonzalez, C.S.G Lee McGraw Hill International Editions 1987.
2. "Introduction to Robotics", John J Craig. Pearson. 4th Edition.

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18CE3221 – GLOBAL WARMING AND CLIMATE CHANGE
(Open Elective – I)

B.Tech. EEE - III Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None

Course objectives: Develop ability to
1. Understand the importance of Ozone layer in the atmosphere.
2. Comprehend composition of atmosphere.
3. Understand impacts of climate change on ecosystem.
4. Understand initiatives taken by different countries to reduce emission of greenhouse gases.
5. Know measures to mitigate greenhouse gases.

Course Outcomes: At the end of the course, student would be able to
CO1. Define greenhouse gases and their influence on global warming.
CO2. Explain physical and chemical characteristics of atmosphere and structure of atmosphere. .
CO3. Explain impacts of climate change on agriculture, forestry and ecosystem.
CO4. Explain initiatives taken by countries to reduce global warming.
CO5. Suggest mitigation measures taken to reduce global warming and climate change.

UNIT–I
Earth's Climate System: Role of ozone in environment - Ozone layer – Ozone depleting gases – Green House Effect – Radioactive effects of Greenhouse gases – The Hydrological cycle – Green House Gases and Global Warming – Carbon Cycle.

UNIT–II
Atmosphere and Its Components: Importance of Atmosphere – Physical and chemical characteristics of Atmosphere – Vertical structure of the atmosphere – Composition of the atmosphere – Atmospheric stability – Temperature profile of the atmosphere – Lapse rates – Temperature inversion – Effects of inversion on pollution dispersion.

UNIT–III
Impacts of Climate change: Causes of Climate change: Changes of Temperature in the environment – Melting of ice pole – sea level rise – Impacts of Climate Change on various sectors – Agriculture, Forestry and Ecosystem – Water Resources – Human Health – Industry, Settlement and Society – Methods and Scenarios – Projected Impacts for different regions – Uncertainties in the projected impacts of Climate Change – Risk of Irreversible Changes.

UNIT–IV
Observed changes and its Causes: Climate change and Carbon credits – CDM – Initiatives in India- Kyoto Protocol – Paris Convention - Intergovernmental Panel on Climate change – Climate Sensitivity and Feedbacks – The Montreal Protocol – UNFCCC – IPCC – Global Climate Models (GCM) - Evidences of Changes in Climate and Environment- on a Global scale and in India.

UNIT–V

Climate change and mitigation measures: Clean Development Mechanism – Carbon Trading – Examples of future clean technology – Biodiesel – Natural Compost – Eco-friendly plastic – Alternate Energy – Hydrogen – Bio-fuels – Solar Energy – Wind – Hydroelectric Power – Mitigation Efforts in India and Adaptation funding. Key Mitigation Technologies and Practices – Energy Supply – Transport – Buildings – Industry – Agriculture – Forestry – Carbon sequestration – Carbon capture and storage (CCS) – Waste (MSW & Bio-waste, Biomedical, Industrial waste) – International and Regional cooperation.

TEXT BOOKS:

1. "Climate Change: An Indian Perspective (Environment and Development)", Dr. Sushil Kumar Dash, Cambridge University Press India Pvt Ltd, 2007.
2. "Adaptation and mitigation of climate change – Scientific Technical Analysis", Cambridge University Press, Cambridge, 2006.

REFERENCE BOOKS:

1. "Atmospheric Science", J.M. Wallace and P.V Hobbs, Elsevier/ Academic Press, 2006.
2. "Climate Change and Climate Variability on Hydrological Regimes", Jan C. Van Dam, Cambridge University Press, 2003.
3. **http://www.ipcc.ch/**

18ME3223– NANOMATERIALS AND TECHNOLOGY
(Open Elective - I)

B.Tech. EEE - III Year II Sem.

L	T	P/D	C
3	-	-/-	3

Pre-requisites: None

Course Objectives: Develop ability to
1. Expose the students to a highly interdisciplinary subject
2. Enable the students to understand the basic concepts of Nanotechnology
3. Enhance the knowledge of students in nanomaterials, properties and their applications

Course Outcomes (COs): At the end of the course, the student will be able to:
CO1. Identify nano materials by their superior characteristics
CO2. Demonstrate synthesis of zero dimensional nano structured materials.
CO3. Illustrate conducive methods to synthesize one dimensional nano structures
CO4. Compare and comprehend methods to produce two dimensional nano structures
CO5. Comprehend synthesis of thin films and special nano materials

UNIT – I

Introduction: Importance of Nano-technology, Emergence of Nano-Technology, Bottom-up and Top-down approaches, challenges in Nano Technology.

UNIT – II

Zero dimensional nano-structures: Nano particles through homogenous nucleation; Growth of nuclei, synthesis of metallic Nano particles, Nano particles through heterogeneous nucleation; Fundamentals of heterogeneous nucleation and synthesis of nano particles using micro emulsions and Aerosol.

UNIT – III

One dimensional nano-structures: Nano wires and nano rods, Spontaneous growth: Evaporation and condensation growth, vapor-liquid-solid growth, stress induced re-crystallization.

Template based synthesis: Electrochemical deposition, Electro-phoretic deposition. Electro- spinning and Lithography

UNIT – IV

Two dimensional nano-structures: Fundamentals of film growth. Physical vapour Deposition (PVD): Evaporation molecular beam epitaxy (MBE), Sputtering, Comparison of Evaporation and sputtering.

Chemical Vapour Deposition (CVD): Typical chemical reactions, Reaction kinetics, transportant phenomena, CVD methods, diamond films by CVD.

UNIT – V

Thin films: Atomic layer deposition (ALD), Electro-chemical deposition (ECD), Sol-Gel films.

Special Nano Materials: Carbon fullerence and nano tubes. Carbon fullerness: formation, properties and applications. Carbon nano tubes: formation and applications.

TEXT BOOKS:

1. "Nano structures and Nano materials: Synthesis, properties and applications", Guozhong Cao, Imperial College press in 2004, 2nd edition.
2. "Nanotechnology", Rechard Booker and Earl Boysen, Willey, 2006.

REFERENCE BOOKS:

1. "Nano: The Essentials"; T. Pradeep, Tata McGraw-Hill, 2008.
3. "Nanotechnology and Nano electronics", W.R. Fahrner, Springer, 2006.

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18EC3224 - ELECTRONIC MEASURING INSTRUMENTS
(Open Elective - I)

B.Tech. EEE - III Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite: None

Course Objectives: Develop ability to
1. Understand the working of various measuring systems and metrics for performance analysis.
2. Understand the principle of operation, working of different electronic instruments viz. signal generators, signal analyzers, recorders and measuring equipment.
3. Understand use of various measuring techniques for measurement of different physical parameters using different classes of transducers.

Course Outcomes (COs): At the end of this course, the student would be able to
CO1. Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.
CO2. Measure various physical parameters by appropriately selecting the transducers.
CO3. Use various types of signal generators, signal analyzers for generating and analyzing various real time signals.

UNIT – I

Block Schematics of Measuring Systems and Performance Metrics: Performance Characteristics, Static Characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag.

UNIT – II

Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary Waveform Generator, and Specifications.

UNIT – III

Measuring Instruments: DC Voltmeters, D' Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments. CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes.

UNIT – IV

Recorders: X-Y Plotter, Curve tracer, Galvanometric Recorders, Servo transducers, pen driving mechanisms, Magnetic Recording, Magnetic recording techniques.

UNIT – V

Transducers: Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers, Digital Temperature sensing system, Piezoelectric Transducers, Variable Capacitance Transducers, Magneto Strictive Transducers.

TEXT BOOKS:

1. "Electronic Measurements and Instrumentation", B.M. Oliver, J.M. Cage TMH Reprint 2009.
2. "Electronic Instrumentation", H.S.Kalsi – TMH, 2nd Edition 2004.

REFERENCES:

1. "Electronic Instrumentation and Measurements", David A. Bell, Oxford Univ. Press, 1997.
2. "Modern Electronic Instrumentation and Measurement Techniques", A.D. Helbincs, W.D. Cooper: PHI 5th Edition 2003.
3. "Electronic Measurements and Instrumentation", K. Lal Kishore, Pearson Education 2010.
4. "Industrial Instrumentation", T.R. Padmanabham Springer 2009.

18CS3225 – JAVA PROGRAMMING

(Open Elective - I)

B.Tech. EEE - III Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18CS1101 – Programming for Problem Solving

Course Objectives: Develop ability to

1. Understand the basic concepts of object oriented programming.
2. Identify control statements and write simple java program.
3. Demonstrate interfaces, inner classes and create a package.
4. Evaluate errors, exceptions and inter thread communication.
5. Implements connectivity with database and use file streams.

Course Outcomes (COs): After completion of the course, student would be able to

CO1. Apply the concepts of OOPs in problem solving.
CO2. Examine control statements and develop a real time application.
CO3. Identify classes, objects, members of a class and relationships among them needed for a specific problem.
CO4. Use Java standard class library with necessary exception handling mechanisms in constructing computer applications.
CO5. Develop java programs using multi-threading, files and database concepts and their connectivity.

UNIT- I

OOP Concepts: Data abstraction, Encapsulation, Inheritance, Types of Inheritance and benefits of inheritance, Polymorphism, Classes and Objects, Procedural and Object oriented programming paradigms.

Java Programming: Introduction, History of Java, Comments, Naming Conventions and Data types, Variables, Constants, Scope and life time of variables.

UNIT- II

Operators: Operator hierarchy, Expressions, Type conversion and casting, Enumerated types, Control statements in JAVA, Simple java programs, Console input and output, Formatting output, Constructors, Methods, Parameter passing, Static fields and Methods, Access control, this keyword, Overloading methods and Constructors, Recursion, Garbage collection, Building strings, Exploring string class.

UNIT- III

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 - Definition, Creating and Accessing a package, Understanding CLASSPATH, Importing packages.

UNIT – IV

Exception handling – Dealing with errors, Benefits of exception handling, 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.

Multi-Threading - Differences between multiple processes and multiple threads, Thread states, Creating threads, Interrupting threads, Thread priorities, Synchronizing threads, Inter thread communication.

UNIT – V

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 data base, Querying a data base and Processing the results, Updating data with JDBC.

TEXT BOOKS:

1. "Java fundamentals – A comprehensive Introduction", Herbert Scheldt and Dale Skrien, TMH, 1st Edition, 2013.
2. "Core Java – An Integrated Approach", R.Nageswara Rao & Kogent Solutions Inc.

REFERENCE BOOKS:

1. "Core Java 2", Volume1, Cay S. Horstmann and Gary Cornell.
2. "Java for Programmers", PJ. Dietel and H.M Deitel Pearson education.
3. "Object Oriented Programming through Java", P.Radha Krishna. Universities Press.
4. "Thinking in Java", Bruce Eckel, and Pearson Education.

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18MB3226-INTELLECTUAL PROPERTY RIGHTS
(Open Elective - I)

B.Tech. EEE - III Year II Sem.

L	T	P/D	C
3	-	-/-	3

Pre-requisites: None

Course objectives: Develop ability to
1. Understand the various concepts, importance and types of intellectual property rights.
2. Discuss the purpose of trademarks.
3. Analyze the fundamental laws of copy rights and patents.
4. Understand trade secret laws, trade secret litigation and unfair completion.
5. Understand the latest developments in IPR.

Course outcomes (COs): At the end of the course, student would be able to:
CO1. Acquire knowledge on intellectual property rights
CO2. Track the regulation process of trademark. Discuss the functions of trademark.
CO3. Identify the importance of copyrights, patents searching process and transfer of Ownership
CO4. Know about secret laws, unfair competition, false advertising.
CO5. Reciprocate to new developments of intellectual property rights.

UNIT – I
Introduction to Intellectual property: Concepts, types of intellectual property, international organizations, agencies and treaties, and importance of intellectual property rights.

UNIT – II
Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT – III
Law of Copy Rights: Fundamentals of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right laws.
Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer.

UNIT – IV
Trade Secrets: Trade secrete law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation. Unfair competition-mis-appropriation right of publicity, false advertising.

UNIT – V
Latest development of intellectual property Rights: new developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international - trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT BOOKS:

1. "Intellectual property right", Deborah, E. Bouchoux, cengage learning.
2. "Intellectual property right - Unleashing the knowledge economy", Prabuddha Ganguli, Tata Mc Graw Hill Publishing Company Ltd.
3. "Cornish, William Rodolph & Llewelyn, David. Intellectual property: patents, copyright, trademarks and allied rights", Sweet & Maxwell, 8/e, 2013.

REFERENCE BOOKS:

1. "Cases and materials on intellectual property", Cornish, William Rodolph. Sweet & Maxwell, 5/e, 2006.
2. "How to make patent drawings: a patent it yourself companion", Lo, Jack and Pressman, David Nolo, 5/e 2007.

18EN32L1- ADVANCED ENGLISH COMMUNICATION SKILLS (AECS) LAB

B.Tech. EEE - III Year II Sem.

L	T	P/D	C
-	-	2/-	1

Pre-requisites: 18EN1101 – English
18EN11L1 – English Language and communication Skills Lab

Course Objectives: Develop ability to

1. Improve fluency in English through well developed vocabulary exercises.
2. Listen to conversational English language spoken by native English speakers and respond appropriately in different social, cultural and professional contexts.
3. Communicate ideas relevantly, coherently and cogently in written form, presentations and interviews.

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Take part in social and professional communication with ease.
CO2. Improve vocabulary and express the same contextually.
CO3. Demonstrate reading techniques namely, skimming and scanning.
CO4. Write formal letters prepare resume, and reports: project and technical reports.
CO5. Make presentations.
CO6. Participate in group discussions expressing ideas relevantly, coherently and cogently.

The following course content with activities/tasks is proposed for the Advanced English Communication Skills (AECS) Lab sessions:

1) **Activities on Fundamentals of Inter- Personal Communication and Vocabulary Building:** Responding appropriately and relevantly using the right body language- discourse skills-word roots, one-words substitutions, business vocabulary, analogy, collocations and uses of vocabulary- Resilience and Personal Management- Managing stress, time, anger and other emotions, assertiveness and culture shock.

2) **Reading Skills**- Reading for facts, specific information, Reading between the lines, negative facts – inferential reading- critical reading

3) **Activities on Writing:** Writing process, gather information, Analysing the content, formatting, editing, Resume writing and CV preparation, writing SOP, letter writing and email writing.

4) **Activities on Presentation Skills:** Oral Presentations (individual & group), seminars, ppts and written presentations through posters/ projects/ portfolio writing, brochures and reports.

5) **Activities on Group Discussion and Interview Skills:** Dynamics of Group Discussion– intervention – summarizing - body language, relevance and organization of ideas and rubrics for evaluation. Pre- interview planning, opening strategies, answering strategies, interview through Tele – Conference &Video – Conference and Mock Interviews, Videos of Mock Interviews.

TEXT BOOKS:

1. Technical Communication by Meenakshi Raman & Sangeetha Sharma, Oxford University Press, 2009.
2. English Vocabulary in Use series, Cambridge University Press 2008.
3. Communication Skills by Leena Sen , PHI Learning pvt ltd, New Delhi 2009.
4. Communication Skills by Sanjay Kumar and Pushp Lata, 2nd edition, Oxford University Press.

18EE32L1 – POWER ELECTRONICS LAB

B.Tech. EEE - III Year II Sem.

L	T	P/D	C
-	-	2/-	1

Pre requisites: 18EE2103 Electrical Circuits Lab

Course Objectives: Develop ability to

1. Distinguish characteristics of three terminal devices like SCR, MOSFET and IGBT.
2. Understand the different firing circuits for SCR
3. Understand the characteristics of single phase and three phase fully controlled and half controlled thyristor based rectifiers with R and RL loads
4. Understand the characteristics of an IGBT/MOSFET based step down chopper.
5. Understand the characteristics of AC voltage controllers and cycloconverters
6. Understand the operation of single phase and three phase bridge inverters with R and RL load

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Obtain SCR, MOSFET and IGBT characteristics for switching operation.
CO2. Distinguish the different types of firing circuits by implementation.
CO3. Compare theoretical and practical implementation of thyristor based single phase/three phase controlled rectifier with R and RL load.
CO4. Implement control of MOSFET/IGBT based DC chopper
CO5. Implement control of TRIAC/thyristor based AC voltage controllers
CO6. Implement frequency conversion using single phase cyclo converters
CO7. Implement single phase/three phase IGBT/MOSFET based inverters
CO8. Simulate single phase controlled rectifier with R and RL load
CO9. Simulate MOSFET/IGBT based DC choppers
CO10. Simulate single phase bridge inverter with R and RL load
CO11. Design an application of power electronic converter and simulate.

LIST OF EXPERIMENTS:

1. Characteristics of SCR, MOSFET and IGBT.
2. Firing circuits of SCR
3. Single phasethyristor based controlled rectifier with R and RL load
4. Control of DC voltage by IGBT based DC chopper
5. Control of AC voltage by thyristor based AC voltage controller
6. Frequency conversion by single phase cycloconverter
7. Single phase IGBT based inverter with R and RL load.
8. Simulation of three phase fully controlled rectifier with R and RL load
9. Simulation of IGBT based step-up and step-down DC chopper.
10. Simulation of single phase inverter with R and RL load.
11. Simulation of application of power electronic converter

Note: All simulation experiments will be simulated using suitable software.

18EC32L3- ANALOG CIRCUITS LAB

B.Tech. EEE - III Year II Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): 18PH1201 – Semiconductor Devices
18PH12L1 – Semiconductor Devices Lab

Course Objectives: Develop ability to

1. Obtain the frequency response of single stage amplifiers.
2. Obtain the frequency response of two stage amplifier.
3. Understand the frequency response of feedback amplifiers.
4. Understand the design considerations of oscillators namely, RC phase shift and LC oscillators for a given frequency of oscillations.
5. Understand the conversion efficiency of large signal amplifiers, Class A and Class B.

Course Outcomes (COs): At the end of the course, the student would be able to

CO 1. Verify the frequency response of single stage amplifier circuits.
CO 2. Verify the frequency response of two stage FET amplifier circuit.
CO 3. Compare the frequency response of an amplifiers with and without feedback.
CO 4. Design and verify RC-phase shift and LC oscillators for given frequency of oscillations.
CO 5. Verify the power conversion efficiency of Class-A and Class-B power amplifiers.

LIST OF EXPERIMENTS:

(A Minimum of TEN Experiments are to be conducted using hardware)

1. Frequency response of single stage RC coupled BJT amplifier
2. Frequency response of single stage CS FET amplifier
3. Frequency response of two-stage RC coupled FET amplifier
4. Frequency response of Voltage Series Feedback Amplifier
5. Frequency response of Current Series Feedback Amplifier
6. Frequency response of Current Shunt Feedback Amplifier
7. Frequency response of Voltage Shunt Feedback Amplifier
8. Design of RC Phase Shift Oscillator using BJT
9. Design of Hartley Oscillator
10. Design of Colpitts Oscillator
11. Determining efficiency of Class A Power Amplifier
12. Determining efficiency of Class B Complementary- Symmetry Power Amplifier

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18MB3203 – PROFESSIONAL ETHICS
(Mandatory Course)

B.Tech. EEE - III Year II Sem.

L	T	P/D	C
3	-	-/-	-

Pre requisites: None

Course Objective: Develop ability to:

1. Imbibe and internalize the Values and Ethical Behavior in the personal and Professional lives.

Course Outcomes(COs): At the end of the course, Students would be able to

CO1. Understand the importance of Values and Ethics in their personal lives and professional careers.

CO2. Learn the rights and responsibilities as an employee, team member and a global citizen.

UNIT - I

Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT - II

Basic Theories: Basic Ethical Principles, Moral Developments, Deontology, Utilitarianism, Virtue Theory, Rights Theory, Casuist Theory, Moral Absolution, Moral Rationalism, Moral Pluralism, Ethical Egoism, Feminist Consequentialism, Moral Issues, Moral Dilemmas, Moral Autonomy.

UNIT - III

Professional Practices in Engineering: Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers - The Centrality of Responsibilities of Professional Ethics; lessons from 1979 American Airlines DC-10 Crash and Kansas City Hyatt Regency Walk away Collapse.

UNIT - IV

Work Place Rights & Responsibilities, Ethics in changing domains of Research, Engineers and Managers; Organizational Complaint Procedure, difference of Professional Judgment within the Nuclear Regulatory Commission (NRC), the Hanford Nuclear Reservation. Ethics in changing domains of research - The US government wide definition of research misconduct, research misconduct distinguished from mistakes and errors, recent history of attention to research misconduct, the emerging emphasis on understanding and fostering responsible conduct, responsible authorship, reviewing & editing.

UNIT - V

Global issues in Professional Ethics: Introduction – Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance,

Sustainable Development Ecosystem, Energy Concerns, Ozone Deflection, Pollution, Ethics in Manufacturing and Marketing, Media Ethics; War Ethics; Bio Ethics, Intellectual Property Rights.

TEXT BOOKS:

1. "Professional Ethics", R. Subramanian, Oxford University Press, 2015.
2. "Ethics in Engineering Practice & Research", Caroline Whitbeck, 2e, Cambridge University Press 2015.

REFERENCE BOOKS:

1. "Engineering Ethics, Concepts Cases", Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, 4e Cengage learning, 2015.
3. "Business Ethics concepts & Cases", Manuel G Velasquez, 6e, PHI, 2008.

B.Tech (EEE)
IV Year I Sem
Detailed Syllabus

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18EC4110 – MICROPROCESSORS AND MICROCONTROLLERS

B.Tech. EEE - IV Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18EC2102 – Digital Design

Course Objectives: Develop ability to:

1. Understand the concepts of 8086 microprocessor architecture, addressing modes and programming.
2. Understand interfacing of 8086, with memory and other peripherals.
3. Understand the architecture and features of 8051 Microcontroller, and programming.
4. Understand interrupts, timers/ counters and serial communication modes of8051.

Course Outcomes (COs): At the end of the course, student would be able to:

CO1. Explain the architecture and modes of operations of 8086 Microprocessor.
CO2. Write assembly language programs (ALPs) for 8086 Microprocessor.
CO3. Design 8251, 8255 interfaces for 8086 Microprocessor.
CO4. Explain the Architecture and features of 8051.
CO5. Design and develop ALP code for 8051 Microcontrollers.
CO6. Explain the operation of the interrupts, timers/ counters and serial communication interface for 8051 Microcontrollers.

UNIT I

8086 Microprocessor: Introduction, 8086 Architecture, Register organization, Memory segmentation, Physical memory organization, Pin diagram and Signal description of 8086 - Minimum mode signals, Maximum mode signals, Common function signals, Timing diagrams – Read and Write for minimum and maximum modes.

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 and string manipulations.

UNIT III

I/O Interface (8255-PPI): Pin diagram and internal architecture, Modes of operation and interfacing to 8086, Interfacing - keyboard, 7-segment display, D/A and A/D converters.

Interrupts: Interrupt structure of 8086, vector interrupt table, Interrupt Service Routines (ISR). **Communication Interface**: Serial communication standards, serial data transfer schemes, 8251 USART architecture and interfacing.

UNIT IV

Microcontrollers: Introduction, 8051 microcontrollers, Pin Diagram and Architecture, memory organization, Memory interfacing, I/O ports, Addressing modes, Instruction set of 8051, Simple programs – arithmetic and logic operations, sorting, branch and call instructions.

UNIT V:

Interrupts: Interrupt structure of 8051, vector interrupt table, interrupt service routine, Programming external hardware interrupts

Timers/Counters: Various modes of timers/counters, Programming 8051 timers/counters, Programming timer interrupts.

Serial communication: serial communication standards, serial data transfer schemes, UART operation, Programming the serial communication interrupts.

TEXT BOOKS:

1. Douglas V. Hall, Microprocessor and interfacing, TMGH, 2nd edition2006
2. Kenneth J. Ayala, The 8051 Microcontroller. 3rd Ed., Cengage Learning.

REFERENCE BOOKS:

1. Advanced Microprocessors and peripherals, A.K Ray and K.M Burch and TMH, 2nd Edition 2006.
2. Micro controllers and Applications - Ajay. V. Deshmukh,TMGH,2005
3. Microcomputer systems, the 8086/8088 Family, architecture, Programming & Design, Yu- Chang Liu & Glenn A Gibson, PHI, 2ndEdition.

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18EE4101 – ELECTRICAL DRIVES

B.Tech. EEE - IV Year I Sem.

L	T	P/D	C
3	-	-/-	3

Pre requisites: 18EE3201 – Power Electronics
18EE2204 – Electrical Machines-I

Course Objectives: Develop ability to

1. Understand concepts related to DC motor control throughpower electronic converters – phase controlled rectifiers and DC choppers
2. Understand concept offour Quadrant operation of DC motors
3. Understand concepts related to AC motor control through power electronic converters – AC voltage controllers, voltage and current source inverters, cyclo converters
4. Understand selection and applications of drives.

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Attain knowledge to control DC motor through single phase and three phase thyristor controlled rectifiers
CO2. Operate and control DC motor through DC choppers
CO3. Implement four quadrant operation of DC motors for various applications
CO4. Operate and control induction motor drives
CO5. Attain knowledge to operate synchronous motor drives.

UNIT – I

Control of DC motors through phase controlled rectifiers: Introduction to electric drives – Control of separately excited DC motor and DC series motor using single phase and three phase thyristor based controlled rectifiers-continuous current operation – output voltage and current waveforms – Speed and torque expressions – Speed–torque characteristics- Numericals.

UNIT – II

Control of DC motors by choppers: Single quadrant andtwo quadrant operation of chopper fed separately excited DC motor and DC series motor – Continuous current operation – Output voltage and current wave forms – Speed torque expressions – speed torque characteristics – Problems on chopper fed DC Motors – Closed Loop operation (Block Diagram Only).

UNIT-III

Four Quadrant Operation of DC Motors: Introduction to Four quadrant operation – Motoring and Electric Braking:- Plugging, Dynamic and Regenerative Braking - Four quadrant operation of D.C motors by dual converters and DC choppers- Closed loop operation of DC motor (Block Diagram Only).

UNIT – IV

Control of Induction Motor

Variable voltage characteristics: Control of induction motor by AC Voltage Controllers – Waveforms – Speed torque characteristics-Numerical problems

Variable frequency characteristics: Variable frequency control of induction motor by voltage source and current source inverter and Cycloconverters- PWM control – Comparison of VSI and CSI operations – Numerical problems

Static rotor resistance control: Slip power recovery – Static Scherbius drive – Static Kramer Drive – Numerical problems

UNIT – V

Control of Synchronous Motors: Separate control & self control of synchronous motors – Operation of self controlled synchronous motors by VSI and CSI - Operation – Waveforms – speed torque characteristics (Block Diagram Only), Selection of electric drives and control schemes for different applications.

TEXT BOOKS:

1. Fundamentals of Electric Drives – by Gopal.K.DubeyNarosa Publications
2. Power Electronics by P.C.Sen, John Wiley and sons

REFERENCE BOOKS:

1. Modern Power Electronics and AC drives by Bimal.K.Bose, Prentice Hall India.
2. Electric Drives by Nisit K. De, P.C. Sen, PHI Publications
3. Power Electronic Circuits, Devices and applications by M.H.Rashid, PHI.
4. Power Semi conductor drives by P.V. Rao BS Publications

18EE4102 – INSTRUMENTATION AND MEASUREMENT TECHNIQUES

B.Tech. EEE - IV Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18EE3103 – Control Systems

Course Objectives: Develop ability to

1. Understand the basic principles of all measuring instruments.
2. Understand the operation of potentiometers, instrument transformers and power factor meter.
3. Understand the concepts of measuring the RLC parameters, voltage, current, power factor,

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Classify different types of measuring instruments their construction, operation and Characteristics.
CO2. Determine the standardization values of potentiometers. Calculate the phase angle and ratio errors of instrument transformers.
CO3. Compute active and reactive powers in balanced and unbalanced systems, driving and braking torques of energy meter along with their errors and compensations.
CO4. Calculate the sensitivity of bridges and obtain the balance condition for various DC and AC bridges.
CO5. Understand the characteristics of electrical transducer and their applications.

UNIT - I

Introduction to Measuring Instruments: Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters - types

UNIT - II

Potentiometers: Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate types Standardization – applications.

Instrument Transformers: CT and PT – Ratio and phase angle errors – design considerations. Type of P.F. Meters – dynamometer and moving iron type – 1-phase – Frequency meters – resonance type and Weston type.

UNIT - III

Measurement of Power: Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems.

Measurement of Energy: Single phase induction type energy meter – driving and braking torques – errors and compensations – testing by phantom loading. Three phase energy meter

UNIT - IV

Resistance Measurements: Method of measuring low, medium and high resistance – sensitivity of Wheat-stone's bridge – Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance – loss of charge method.

A.C. Bridges: Measurement of Inductance, Quality Factor - Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle – Desauty's bridge. Wien's bridge – Schering Bridge.

UNIT - V

Transducers and Oscilloscope: Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle of operation of resistor, inductor, LVDT and capacitor transducers; Strain gauge and its principle of operation, Guage factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, photo diodes. Cathode ray oscilloscope-Cathode ray tube-time base generator-horizontal and vertical amplifiers -applications of CRO-Measurement of phase and frequency-lissajous patterns.

TEXT BOOKS:

1. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C. Widdis, fifth Edition, Wheeler Publishing.
2. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co. Publications.

REFERENCE BOOKS:

1. Electrical Measurements – Buckingham and Price, Prentice – Hall.
2. Electrical Measurements: Fundamentals, Concepts, Applications – Reissland, M.U, New Age International (P) Limited, Publishers.
3. Principles of Measurement and Instrumentation – by A.S Morris, Pearson /Prentice Hall of India.

18EE4103 – POWER SYSTEM PROTECTION

(Professional Elective –IV)

B.Tech. EEE - IV Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18EE2202 – Power Systems – I
18EE3101 – Power Systems – II

Course Objectives: Develop ability to

1. Understand basic operation of Circuit Breakers
2. Understand basic operation of different Relays and its applications
3. Understand the methods used for protection of Generators, Transformers, feeders and bus bars
4. Understand concept of Neutral grounding and Earthing.
5. Understand the protection techniques against over voltages and other hazards.

Course Outcomes: At the end of the course, student would be able to

CO1. Various types of protective devices and their coordination
CO2. Protection of generators, transformers, feeders, bus bars through different types of protective devices.
CO3. Over voltage protection and lightening
CO4. Earthing and Grounding
CO5. Application of above conceptual things to real world electrical and electronics problems.

UNIT -1

Circuit Breakers: Introduction – elementary principles of arc interruption, Recovery, Re-striking Voltage and Recovery voltages Re-striking Phenomenon, Average and Max. RRRV, Numerical problems – Current Chopping and Resistance Switching – CB ratings and Specifications, Types and Numerical Problems – Auto re-closures.

Description and Operation of types of circuit breakers: Minimum Oil Circuit Breaker, 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, Induction Disc and Induction Cup Relays.

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 relays, Characteristics and Comparison.

Static Relays: Introduction, Static Relays verses Electromagnetic Relays.

UNIT – III

Protection of generators: against Stator faults, Rotor faults, and Abnormal Conditions, Restricted Earth fault and inter-turn fault protection. Numerical Problems on percentage winding unprotected.

Protection of transformers: Protection of power transformers-Percentage Differential Protection, Numerical Problem on Design of CTs Ratio and 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. Tanslay 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, Resonant – Arcing Grounds, harmonic suppressors, and grounding Practices.

UNIT – V

Protection against over voltages due to lightening: Introduction, internal and external causes of overvoltage's, mechanism of lighting and wave shape of lighting strokes, protection against lighting-Expulsion, valve and metal oxide Lighting Arresters – **Insulation Coordination** – BIL, Impulse Ratio, Standard impulse Test Wave, Volt- Time Characteristics.

TEXTBOOKS:

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

REFERENCE BOOKS:

1. A Text book on Power System Engineering by B. L. Soni, Gupta, Bhatnagar, Chkarabarthy, Dhanpat Rai & Co.
2. Fundamentals of Power System Protection by Paithankar and S. R. Bhide, PHI, 2003.
3. Electrical Power Systems – by C. L. Wadhawa, New Age International (P) Limited, Publishers, 3rd edition.
4. A Course in Power Systems by J. B. Gupta S. K. Kataria& Sons.

18EE4104 – SWITCHED MODE POWER SUPPLIES

(Professional Elective –IV)

B.Tech. EEE - IV Year I Sem.

L	T	P/D	C
3	-	-/-	3

Pre requisites: 18EE3201 Power Electronics
18EE2204 Electrical Machines-I

Course Objectives: Develop ability to

1. Understand switches required for DC-DC converters
2. Understand the reactive components in converter circuit for design
3. Understand the difference between isolated and non-isolated converters
4. Design controllers for converters.

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Acquire knowledge about components for converter design – switches and reactive components
CO2. Acquire knowledge about DC-DC converters – isolated and non-isolated
CO3. Acquire knowledge about control and design aspects for converters
CO4. Model converters and controllers
CO5. Design controllers for practical applications

UNIT – I

Introduction: Review of power semiconductor switches: Diode and Controlled switches- DC-DC converters

UNITS – II

Reactive components: Inductor – Transformer- Capacitor – Issues related to switches – Energy storage: Capacitor and Inductor.

UNIT – III

Non-isolated and isolated converter: Series and shunt controlled converter, primitive DC-DC converter, continuous and discontinuous conduction mode of operation: Forward converter, Push-pull converter, Half and full bridge converter, Fly-back converter

UNIT –IV

Modelling of converters: Introduction – State space representation – Circuit averaging – Modelling of boost converter – DC-DC converter controller- Controller structure – Implementation of PID controller

UNIT – V

Control applications: Controller design- controllers and sensing circuit - Regulation of multiple outputs – Current control – Unity power factor converter.

TEXTBOOKS:

1. V.Ramanarayanan – Course Materieal on Switched Mode Power Conversion, Department of Electrical Engineering, Indian Institute of Science, Bangalore.

2. Switched Mode Power Supplies, Design and Construction, H. W. Whittington, B. W. Flynn and D. E. MacPherson, Universities Press, 2009 Edition

REFERENCE BOOKS:

1. Krein P.T .Elements of Power Electronics., Oxford University Press
2. M. H. Rashid, Power Electronics. Prentice-Hall of India
3. Mohan N. Undeland . T & Robbins W., Power Electronics Converters, Application and Design. John Wiley, 3rd edition, 2002

18EE4105 – EHV AC TRANSMISSION SYSTEMS
(Professional Elective IV)

B.Tech. EEE - IV Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite: 18EE3101 – Power Systems - II

Course Objectives: Develop ability to
1. To understand the basic concepts of EHV AC transmission.
2. To get the Knowledge on EHV transmission line inductance and capacitance
3. To understand the voltage gradients of conductor
4. To identify corona effects on transmission lines
5. To calculate electrostatic fields of EHV AC lines and its effects
6. To Analyze travelling waves
7. To distinguish various compensators for voltage control

Course Outcomes: At the end of the course, student would be able to
CO1. Understand the basic concepts of EHV AC transmission.
CO2. Get the Knowledge on EHV transmission line inductance and capacitance
CO3. Understand the voltage gradients of conductor
CO4. Identify corona effects on transmission lines
CO5. Calculate electrostatic fields of EHVAC lines and its effects
CO6. Analyze travelling waves
CO7. Distinguish various compensators for voltage control

UNIT – I

Preliminaries: Necessity of EHV AC transmission – advantages and problems–power handling capacity and line losses- mechanical considerations – resistance of conductors – properties of bundled conductors – bundle spacing and bundle radius- Examples.

UNIT – II

Line and Ground Reactive Parameters: Line inductance and capacitances – sequence inductances and capacitances – modes of propagation – ground return – Examples

Voltage Gradients of Conductors: Electrostatics – field of sphere gap – field of line changes and properties – charge – potential relations for multi-conductors – surface voltage gradient on conductors – distribution of voltage gradient on sub-conductors of bundle – Examples.

UNIT – III

Corona Effects – I: Power loss and audible noise (AN) – corona loss formulae – charge voltage diagram – generation, characteristics - limits and measurements of AN – relation between 1-phase and 3-phase AN levels – Examples.

Corona Effects – II: Radio interference (RI) - corona pulses generation, properties, limits – frequency spectrum – modes of propagation – excitation function – measurement of RI, RIV and excitation functions – Examples.

UNIT – IV

Electro Static Field: Electrostatic field: calculation of electrostatic field of EHV/AC lines – effect on humans, animals and plants – electrostatic induction in un-energized circuit of double-circuit line – electromagnetic interference-Examples.

Traveling Wave Theory: Traveling wave expression and solution- source of excitation terminal conditions- open circuited and short-circuited end- reflection and refraction coefficients-Lumped parameters of distributed lines-generalized constants-No load voltage
conditions and charging current.

UNIT – V

Line Compensation: Power circle diagram and its use – voltage control using synchronous condensers – cascade connection of shunt and series compensation – sub synchronous resonance in series capacitor – compensated lines – static VAR compensating system.

TEXT BOOKS:

1. "R. D. Begamudre", EHVAC Transmission Engineering, New Age International (p) Ltd., 3rd Edition 2006.
2. S. Rao, HVAC and DC Transmission, Khanna Publishers, 3rd Edition 2001.

REFERENCE BOOKS:

1. "E. Kuffel, W. S. Zaengl, J. Kuffel", High Voltage Engineering Fundamentals, Elsevier, 3rd Edition 2016.
2. "Mazen Abdel-salam, Hussein Ains, Abdab EI – Mors hedy and Roshdy Radwan", High Voltage Engineering: Theory and Practice, CRC Press, 2nd Edition 2000.
3. "Hugh M. Ryan", High Voltage Engineering and Testing, IEE power and energy series 32, The Institution of Engineering and Technology 2nd edition 2001.

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18EE4106 – ARTIFICIAL NEURAL NETWORKS AND FUZZY SYSTEMS
(Professional Elective IV)

B.Tech. EEE - IV Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite: None

Course Objectives: Develop ability to
1. Introduce the basics of Neural Networks and its architectures.
2. Introduce the Fuzzy sets and Fuzzy Logic system components
3. Deal with the applications of Neural Networks and Fuzzy systems

Course Outcomes: At the end of the course, student would be able to
CO1. Understand artificial neural network models and their training algorithms
CO2. Understand the concept of fuzzy logic system components, fuzzification and defuzzification
CO3. Apply the above concepts to real-world problems and applications.

UNIT – I

Introduction To Neural Networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

Essentials of Artificial Neural Networks: Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application.

UNIT – II

Feed Forward Neural Networks: Single Layer Feed Forward Neural Networks: Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications.

Multilayer Feed forward Neural Networks: Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT - III

Associative Memories: Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory). Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem. Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network.

UNIT – IV

Classical and Fuzzy Sets: Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT – V

Fuzzy Logic System: Fuzzification, Membership value assignment, development of rule base and decision-making system, Defuzzification to crisp sets, Defuzzification methods.

TEXT BOOKS:

1. Rajasekharan and Pai, Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications– PHI Publication, 1st Edition, 1905
2. Satish Kumar, Neural Networks, TMH, 2004.

REFERENCE BOOKS:

1. “James A Freeman and Davis Skapura”, Neural Networks, Pearson Education, 2002.
2. “Simon Hakins”, Neural Networks, Pearson Education, 3rd Edition 2008.
3. C. Eliasmith and Ch. Anderson, Neural Engineering, PHI, 2004.

18CE4131 – BUILDING TECHNOLOGY
(Open elective – II)

B.Tech. EEE - IV Year I Sem.

L	T	P/D	C
3	-	-/-	3

Pre Requisites:**None.**

Course Objectives: Develop ability to
1. Know the various materials used in the buildings.
2. Understand the building by-laws and ventilation required in the buildings.
3. Estimate the repairs and transportation systems required in buildings.
4. Know the prefabrication and Air condition requirements.
5. Know the plumbing systems required in building.

Course Outcomes: At the end of the course, student would be able to
CO1. Explain characteristics of building materials.
CO2. Describe the building Bye laws and plan the building.
CO3. Estimate the repairs in building and types of transportation in building.
CO4. Assess the prefabrication systems and air conditioning required in buildings.
CO5. Explain principles of acoustics in building and plumbing.

UNIT – I
Stones: Uses of stones as building materials, Characteristics of good building stones. Types of stones and their significance.
Bricks: Characteristics of good building bricks. Types of bricks and their significance.
Cement and Concrete: Ingredients of cement – Types of cement, properties and uses of cement. Overview on concrete.

UNIT – II
Building: Basic definitions, Types, components, economy and design, principles of planning of buildings and their importance, building bye-laws.
Ventilation: Definitions and importance of circulation; Lighting and ventilation; how to consider these aspects during planning of building.

UNIT – III
Repairs in Buildings: Inspection, control measures and precautions for various construction defects, General principles of design of openings, and various types of fire protection measures to be considered while planning a building.
Vertical transportation in buildings: Types of vertical transportation, Stairs, different forms of stairs, planning of stair cases, other modes of vertical transportation – lifts, ramps, escalators.

UNIT – IV
Prefabrication systems: Prefabrication systems in residential buildings – walls, openings, cupboards, shelves, etc., planning and modules and sizes of components in prefabrication.
Air conditioning: Process and classification of air conditioning, Dehumidification. Systems of air conditioning, ventilation, functional requirements of ventilation.

UNIT – V

Acoustics: Acoustics, effect of noise, properties of noise and its measurements, Principles of acoustics of building. Sound insulation – Importance and measures.

Plumbing services: Water supply system, maintenance of building pipe line, Sanitary fittings, principles governing design of building drainage.

TEXT BOOKS:

1. Building Materials, P.C. Varghese, Prentice Hal India Learning Pvt. Ltd., 2015.
2. Building Construction, B.C.Punmia, Er. Ashok Kumar Jain and Dr. Arun Kumar Jain, Laxmi Publications, 2016.

REFERENCE BOOKS:

1. Building Materials, S.K. Duggal, New Age, 2016.
2. Building Materials, S.S. Bhavikatti, Vikas Publishers, 2016.
3. Engineering Materials and Building Construction, Rangwala, Charotar Publishing House, 2015.
4. A Text book of Building Construction, Arora and Bindra, Dhanpat Rai Publications, 2014.

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18ME4133 – DIGITAL FABRICATION
(Open Elective-II)

B.Tech. EEE - IV Year I Sem.

L	T	P/D	C
3	-	-/-	3

Pre-requisites: None

Course Objectives: Develop ability to,
1. Introduce basics of geometric modeling of physical objects,
2. Convert digital data to obtain physical components by metal subtraction and addition processes.

Course Outcomes: At the end of the course, student would be able to
CO1. Select an appropriate geometric modeling scheme required for manufacturing
CO2. Interpret machining operations required in subtractive manufacturing
CO3. Compare additive manufacturing methods and comprehend on the process to be adopted
CO4. Illustrate the robotic applications in manufacturing and assembly
CO5. Select an appropriate polymer by comparing properties and manufacturing requirements

UNIT I

Geometric modelling-2D, 2 ½ D, 3D Modelling; Solid representations-CSG, Boundary representations, VOXEL representations; Overview of digital manufacturing processes

UNIT II

Subtractive Manufacturing –Introduction to G codes and M codes; Operations on CNC Lathe- Turning and facing; operations on CNC Mill-Planing, grooving and drilling; Introduction to simple CNC Program (Demonstration only);

UNIT III

Additive Manufacturing- Stereo lithography, Selective Laser Sintering, Fused Deposition Modeling; Conversion of Geometric model to .stl for 3D printing (Demonstration only)

UNIT IV

Robotic manipulations: Cutting- Laser Cutting, Plasma Cutting, Water jet cutting; bending; folding; stacking; weaving; stitching, Bio printing, Food Printing;

UNIT-V

Introduction to Engineering polymers - acetals (polyoxymethylenes), ABS, (Acrilonitrile-Butadiene-Suyrene), polycarbonates, polyphenylene ethers and oxides, polyamides (nylons); and thermoplastic polyesthers.

TEXT BOOKS:

1. Digital Fabrication, Philip F. Yuan, Neil Leach, Tonji University press
2. Digital Fabrication in Architecture, Luca Caneparo, Engineering and Construction, Springer

REFERENCE BOOKS:

1. Additive Manufacturing Methodologies: Rapid Prototyping to Direct Digital Manufacturing,Gibson, I, Rosen, D W., and Stucker, B., Springer, 2010.
2. Rapid Prototyping – Laser Based and Other Technologies, Venu vinod, PK., Ma, W., Kluwer, 2004.
3. Fundamentals of electronic materials and devices, Safa O Kasap, Mc Graw Hill, 3rd ed

WEB SOURCE ON FREE ON LINE COURSE:

1. https://www.classcentral.com/course/kadenze-introduction-to-digital-fabrication-and-technical-design-9440
2. https://nptel.ac.in/courses/112102103/13

18EC4134 – PRINCIPLES OF COMMUNICATION SYSTEMS

(Open Elective - II)

B.Tech. EEE - IV Year I Sem.

L	T	P/D	C
3	-	-/-	3

Pre requisites: None

Course Objectives: Develop ability to

1. Understand various analog and digital modulation schemes.
2. Understand the concepts of satellite, optical, cellular, mobile, wireless and telecom systems.

Course Outcomes: At the end of the course, student would be able to

CO1. Distinguish various types of modulations.
CO2. Explain different communication modules and their implementation.
CO3. Distinguish various wireless and cellular, mobile and telephone communication systems.

UNIT I

Introduction: Need for Modulation, Frequency translation, Electromagnetic spectrum, Gain, Attenuation and decibels.

UNIT II

Simple description on Modulation: Analog Modulation-AM, FM, Pulse Modulation-PAM, PWM, AM Radio, FM Radio, Transmitters and Receivers

UNIT III

Telecommunication Systems: Telephones Telephone system, Paging systems, Internet Telephony.
Networking and Local Area Networks: Network fundamentals, LAN hardware, Ethernet LANs, Token Ring LAN.

UNIT IV

Satellite Communication: Satellite Orbits, Satellite communication systems, Satellite subsystems, Ground Stations, Satellite Applications, Global Positioning systems.
Optical Communication: Optical Principles, Optical Communication Systems, Fiber –Optic Cables, Optical Transmitters & Receivers, Wavelength Division Multiplexing.

UNIT V

Cellular and Mobile Communications: Cellular telephone systems, AMPS, GSM, CDMA, WCDMA.
Wireless Technologies: Wireless LAN, PANs and Bluetooth, ZigBee and Mesh Wireless networks, Wimax and MANs, Infrared wireless, RFID communication, UWB.

Note: Only Block Diagram Approach with Qualitative Treatment of the topics is required. Detailed mathematical treatment is not required.

TEXT BOOKS:

1. Principles of Electronic Communication Systems, Louis E. Frenzel, 3e, McGraw Hill publications, 2008.
2. Kennedy, Davis, Electronic Communications Systems, 4e, TMH, 1999

REFERENCE BOOKS:

1. Tarmo Anttalainen, Introduction to Telecommunications Network Engineering, Artech House
2. Theodore Rappaport, Wireless Communications-Principles and practice, Prentice Hall, 2002.
3. Roger L. Freeman, Fundamentals of Telecommunications, 2e, Wiley publications.
4. Wayne Tomasi, Introduction to data communications and networking, Pearson Education, 2005.

18CS4135 - KNOWLEDGE MANAGEMENT
(Open Elective - II)

B.Tech. EEE - IV Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisites: 18MB3201- Management Fundamentals

Course Objectives: Develop ability to
1. Understand Knowledge Management Systems for access and coordination of Knowledge assets.
2. Understand technologies namely intranet, group-wares, weblog, instant messaging, content management systems and email in both individual and organizational contexts.
3. Use case studies, research methods of Knowledge organization.
4. Understand and implement various knowledge capturing techniques.
5. Test the captured knowledge and to deploy the knowledge.

Course Outcomes: At the end of the course, student would be able to:
CO1. Evaluate and Implement Knowledge Management Systems to facilitate individual and group work.
CO2. Develop a thorough review of Knowledge Management Concepts, both historical and speculative.
CO3. Originate and distribute research on a Knowledge Management System topic.
CO4. Analyze and design KM processes and Systems.
CO5. Apply Knowledge Management objectives in projects across diverse fields.

UNIT-I

Knowledge management: KM Myths –KM Life Cycle-Understanding Knowledge-Knowledge, Intelligence-Experience-Common Sense-Cognition and KM-Types of Knowledge-Expert Knowledge-Human Thinking and Learning.

UNIT-II

Knowledge management system life cycle: Challenges in Building KM Systems –Conventional KM System Life Cycle(KMSLS) – Knowledge Creation and Knowledge Architecture – Nonaka's Model of Knowledge Creation and Transformation. Knowledge Architecture.

UNIT-III

Capturing knowledge: Evaluating the Expert – Developing a Relation Ship with the Experts – Fuzzy Reasoning and Quality of Knowledge – Knowledge Capturing Techniques , Brain Storming – Protocol Analysis – Consensus Decision Making – Report Grid – Concept Mapping – Black Boarding.

UNIT-IV

Knowledge codification: Modes of Knowledge Conversion – Codification Tools and Procedures – Knowledge Developers Skill Sets – System Testing and Deployment – Knowledge Testing - Approaches to Logical Testing, User Acceptance Testing – KM Systems Deployment Issues – User Training – Post Implementation.

UNIT-V

Knowledge transfer and sharing: Transfer Methods - and Role of the Internet – Knowledge Transfer in the e-World – KM System Tools – Neural Network – Association Rules – Classification Trees – Data Mining and Business Intelligence – Decision Making Architecture – Data Management – Knowledge Management Protocols – Managing Knowledge Workers.

TEXT BOOKS:

1. Elias.M.Awad & Hassan.M.Ghaziri–"Knowledge Management" Pearson Edition.

REFERENCE BOOKS:

1. Guus Schreiber , Hans Akkermans, AnjoAnjewierden, Robert de Hoog , Nigel Shadbolt, Walter Van de Velde and Bob Wielinga, "Knowledge Engineering and Management", Universities Press, 2001.
2. C.W.Holsapple, "Handbooks On Knowledge Management", International Handbooks on Information Systems, Vol 1and 2 , 2003.

18MB4136-SUPPLY CHAIN MANAGEMENT
(Open Elective - II)

B.Tech. EEE - IV Year I Sem.

L	T	P/D	C
3	-	-/-	3

Pre requisites: None

Course Objectives: Develop ability to
1. Distinguish the different functional areas in businesses management; understand the cross functional integrations and map supply chains of various business sectors.
2. Identify different types of distribution/ modes of transport/ network design.
3. Analyze the operational issues in SCM.
4. Recognize the drivers of supply chain.
5. Interpret the importance of relationships with suppliers and customers.

Course Outcomes: At the end of the course, student would be able to:
CO1. Understand the role of an Engineer as well as Manager in Supply chain management
CO2. Appreciate the importance of logistics in integrating different functional areas.
CO3. Integrate operations with functional areas.
CO4. Visualize the role of logistics and distribution as supply chain drivers
CO5. Understand the importance of supplier and customer relationship management.

UNIT–I

Introduction to Supply Chain Management: Understanding the Supply Chain, Supply Chain Performance: Achieving Strategic Fit and Scope including: Customer and Supply Chain Uncertainty, Competitive and Supply Chain Strategies, Product development strategy, Marketing and sales strategy, Supply chain strategy, Scope of strategic fit; Supply Chain Drivers and Metrics.

UNIT–II

Logistics Management: Designing distribution networks and applications to e-Business, Network design in the Supply Chain, Designing global supply chain, network design, 3 PL, 4 PL, Transportation in supply chain management.

UNIT–III

Planning and managing inventories: Managing Economies of Scale in a Supply Chain: Cycle Inventory, Managing Uncertainty in a Supply Chain: Safety Inventory, Determining the Optimal Level of Product Availability. Demand Forecasting in a Supply Chain, Aggregate Planning in a Supply Chain, Sales and Operations Planning: Planning Supply and Demand in a Supply Chain, Coordination in a Supply Chain. E- Procurement, Global alliances.

UNIT–IV

Managing Cross - Functional Drivers in a Supply Chain: Importance of sourcing decisions in Supply Chain Management, Price and Revenue management, role of Information Technology in a Supply Chain, Sustainability and the Supply Chain. Customer Relationship management.

UNIT–V

Logistics and supply chain relationships: Identifying logistics performance indicators- channel structure- economics of distribution- channel relationships- logistics service alliance. Managing global logistics and global supply chains: Logistics in a global economy- Views of global logistics- global operating levels interlinked global economy. Global supply chain, Supply chain management in Global environment Global strategy- Global purchasing- Global logistics- Global alliances- Issues and Challenges in global supply chain management.

TEXT BOOKS:

1. Sunil Chopra, Peter Meindle, D.V Kalra, Supply Chain Management 6/e, Pearson.
2. Donald J. Bowersox and David J. Closs, Logistics Management: The Integrated Supply Chain Process, TMH, 2006.
3. Sridhara Bhat: Logistics and Supply Chain Management, EXCEL, 2009.

REFERENCE:

1. The Toyota Way Paperback by Jeffrey Liker.

18EC41L4–MICROPROCESSORS AND MICROCONTROLLERS LAB

B.Tech. EEE - IV Year I Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): 18EC21L1 – Digital Design Lab
18EC2102 – Digital Design

Course Objectives: Develop ability to:

1. Write Assembly Language Programs for various arithmetic and logical operations using 8086.
2. Interface various I/O devices with 8086 processor kits.
3. Write Assembly Language Programs for various arithmetic and logical operations using 8051 microcontroller kits.
4. Interface various I/O devices with 8051 microcontroller kits.
5. Write and execute interfacing programs in Assembly Language for 8086 processor and 8051microcontroller.

Course Outcomes: At the end of the course, student would be able to:

CO1. Write programs in assembly language using the instruction set of 8086 through MASM software as well as using 8086 Kit.
CO2. Interface different I/O devices with 8086.
CO3. Write programs in assembly language using instruction set of 8051 and execute the same.
CO4. Verify the operations of the timer, counter and serial port (UART) of 8051.
CO5. Interface different I/O devices with 8051.

LIST OF EXPERIMENTS:

(Minimum 12 experiments are to be conducted using MASM/ Keil softwares and/or Hardware Kits).

Part A:
8086: Kit and/or MASM Programming (Minimum 4 experiments to be conducted)

1. Programs for 16 bit arithmetic operations (using various addressing modes)
2. Program for sorting an array
3. Program for searching for a number or character in a string
4. Program for String manipulations
5. Program to generate Fibonacci Series

Interfacing with 8086 Microprocessor: (Minimum 3 experiments to be conducted)

6. Interfacing ADC and DAC to8086.
7. Parallel communication between two microprocessors using8255.
8. Serial communication between two microprocessor kits using8251.
9. Verification of various modes of operation of8255.

Part B: (Minimum 5 experiments to be conducted)
8051: Kit and/or Keil Programming

10. Programming using arithmetic, logical and bit manipulation instructions of8051
11. Program and verify Timer/Counter in8051.
12. Program and verify interrupt handling in8051.

13. Verification of UART operation in8051.

Interfacing with 8051 Microcontroller

14. Communication between 8051 kit and PC.
15. Interfacing Keyboard/Display to8051.

Additional Experiments:

1. Interfacing LCD to8051.
2. Wave form generation using Keil.
3. Programs using DOS/BIOS interrupts.

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18EE41L1 – ELECTRIC DRIVES LAB

B.Tech. EEE - IV Year I Sem.

L	T	P/D	C
-	-	2/-	1

Pre requisites: 18EE3201 Power Electronics

18EE32L1 Power Electronics Lab

Course Objectives: Develop ability to

1. Understand the control mechanisms for DC drives with AC and DC inputs
2. Understand closed loop operation of a drive system
3. Understand control mechanisms for AC drives
4. Extend their knowledge to implement the above control mechanisms to special machine drive systems

Course Outcomes: At the end of the course, student would be able to

CO1. Implement control for DC drive with three phase controlled rectifier.
CO2. Implement control for DC drive with four quadrant chopper.
CO3. Implement speed control of three phase slip ring induction motor using rotor resistance control
CO4. Implement speed control of induction motor using cycloconverter.
CO5. Implement speed control of induction motor using inverter.
CO6. Implement speed control of PMDC motor with a chopper circuit.
CO7. Simulate a DC drive system with a single phase rectifier.
CO8. Simulate a DC drive system with a four quadrant chopper
CO9. Simulate an AC drive system with a PWM inverter
CO10. Simulate an AC drive system with V/f control

LIST OF EXPERIMENTS:

1. Three phase input Thyristorised drive for 3 HP DC Motor with closed loop control.
2. Closed loop control of DC Motor using four quadrant chopper fed drive.
3. Speed Control of Three phase wound induction motor.
4. Cyclo-converter based single phase induction motor control
5. Speed control of three phase induction motor using Inverter.
6. IGBT based single 4-quadrant chopper drive for PMDC motor with speed measurement and closed loop control measurement
7. Simulation of three phase rectifier based DC drive.
8. Simulation of chopper fed DC drive for four quadrant operation.
9. Simulation of PWM inverter based 3-phase induction motor drive.
10. Simulation of V/f control operation of three phase induction motor drive

Note:
All simulation experiments will be simulated using MATLAB Simulink /PSPICE or equivalent software.

18EE41L2 – INSTRUMENTATION AND MEASUREMENT TECHNIQUES LAB

B.Tech. EEE - IV Year I Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): 18EE4102 Instrumentation & Measurement Techniques
18EE31L2 Electrical Machines-II Lab

Course Objectives: Develop ability to

1. Verify the basic principles measuring instruments.
2. Be familiar with various electrical instruments like potentiometers, instrument transformers, power factor meter, AC and DC bridges and transducers.
3. Understand the concepts of measuring the RLC parameters, voltage, current, power factor, power and energy.

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Distinguish the basic types of meters used for measurements.
CO2. Determine the standardization values of potentiometer.
CO3. Calculate the phase angle and ratio errors of instrument transformers.
CO4. Compute active and reactive powers in balanced and unbalanced systems.
CO5. Calculate unknown resistance, inductance and capacitance of DC and AC bridges
CO6. Compute the breakdown strength of transformer oil.
CO7. Distinguish the types of transducers

LIST OF EXPERIMENTS:

Any ten of the following experiments are required to be conducted.

1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer power factor meter
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter
4. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance.
5. Dielectric oil testing using H.T. testing Kit
6. Schering Bridge & Anderson Bridge.
7. Measurements of 3 phase reactive power with single-phase wattmeter.
8. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.
9. Calibration LPF wattmeter – by Phantom testing
10. LVDT and Capacitance pickup – characteristics and Calibration
11. Resistance strain gauge – strain measurements and Calibration
12. Measurement of % ratio error and phase angle of given C.T.

B.Tech (EEE)
IV Year II Sem
Detailed Syllabus

18EE4201 HIGH VOLTAGE ENGINEERING

(Professional Elective - V)

B.Tech. EEE - IV Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18EE2202 – Power Systems I
18EE2102 – Electromagnetic fields

Course Objectives: Develop ability to

1. To deal with the detailed analysis of Breakdown occurring in gaseous, liquids and solid dielectrics
2. To inform about generation and measurement of High voltage and current
3. To introduce High voltage testing methods

Course outcomes: At the end of the course, student would be able to

CO1. Acquire knowledge on, basics of high voltage engineering
CO2. understand break-down phenomenon in different types of dielectrics
CO3. understand generation and measurement of high voltages and currents
CO4. understand the phenomenon of over-voltages, concept of insulation co-ordination
CO5. know testing of various materials and electrical apparatus used in high voltage engineering

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.

TEXT BOOKS:

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..

18EE4202 – FLEXIBLE AC TRANSMISSION SYSTEMS
(Professional Elective - V)

B.Tech. EEE - IV Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18EE3101 – Power Systems – II
18EE3201 – Power Electronics
18EE3202 – Power System Operation and Control

Course Objectives: Develop ability to
1. To understand the fundamentals of FACTS Controllers
2. To know the importance of controllable parameters and types of FACTS controllers & their benefits
3. To understand the objectives of Shunt and Series compensation
4. To Control STATCOM and SVC and their comparison and the regulation of STATCOM, functioning and control of GCSC, TSSC and TCSC

Course Outcomes (COs): At the end of the course, student would be able to
CO1. Choose proper controller for the specific application based on system requirements
CO2. Understand various systems thoroughly and their requirements
CO3. Understand the control circuits of Shunt Controllers SVC & STATCOM for various functions viz. Transient stability Enhancement, voltage instability prevention and power oscillation damping
CO4. Understand the Power and control circuits of Series Controllers 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 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, midpoint 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 and hybrid var generators.

UNIT - IV
SVC and STATCOM: SVC: FC-TCR and TSC-TCR. STATCOM: The regulation and slope. Comparison between SVC and STATCOM

UNIT - V

Static Series Compensators: Objectives of Series compensation, concept of series capacitive compensation, GTO thyristor-controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor-controlled series capacitor (TCSC) control schemes for GSC TSSC and TCSC.

TEXT BOOKS:

1. "N.G. Hingorani and L. Guygi", Understanding FACTS Devices, IEEE Press Publications 2000.
2. "Yong- Hua Song, Allan Johns", Flexible AC Transmission System, IEE Press 1999.

REFERENCE BOOKS:

1. "Kalyan K. Sen and Meylingsen", Introduction to FACTS Controllers, John wiley& sons, Inc., Mohamed E. EI – Hawary Series editor, 2009.
3. "K. R Padiyar, Motilal", FACTS controllers in power transmission and distribution UK Books of India 2007.

18EE4203 – POWER QUALITY

(Professional Elective - V)

B.Tech. EEE - IV Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite: 18EE3101 – Power Systems - II

Course Objectives: Develop ability to

1. Define power quality and different terms of power quality.
2. Study voltage power quality issue – short and long interruption.
3. Study characteristics of voltage sag
4. Know the behavior of power electronics loads; induction motors, synchronous motor etc by the power quality issues.
5. Study mitigation of power quality issues by the VSI converters.

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Know the severity of power quality problems in distribution system

CO2. Understand the concept of voltage sag transformation from up-stream (higher voltages) to down stream (lower voltage)

CO3. Improve the power quality to sensitive load by various mitigating custom power devices

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: 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

Single and Three 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.

Power Quality and EMC Standards: Introduction to standardization, IEC Electromagnetic compatibility standards, European voltage characteristics standards, PQ surveys.

TEXT BOOKS:

1. "Math H J Bollen", "Understanding Power Quality Problems" , IEEE Press, 2000.
2. "R. Sastry Vedam and Mulukutla S. Sarma", "Power Quality VAR Compensation in Power Systems", CRC Press, 2008.

REFERENCE BOOKS:

1. C. Sankaran, Power Quality, CRC Press 2001.
2. Roger C. Dugan, Mark F. Mc Granaghan, Surya Santoso, H. Wayne Beaty, Electrical Power Systems Quality, Tata McGraw Hill Education Private Ltd, 3rd Edition 2012.

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EC4206-DIGITAL SIGNAL PROCESSING
(Professional Elective - V)

B.Tech. EEE - IV Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisites: 18EE2201- Signals, Systems and Transform Techniques

Course Objectives: Develop Ability to
1. Understand fundamental concepts involved in the analysis and processing of discrete signals.
2. Distinguish between various discrete -time signals and Systems.
3. Understand frequency domain analysis of discrete signals and systems using DTFT, DFT and FFT tools.
4. Understand the design of Infinite Impulse Response (IIR) and Finite Impulse Response (FIR) filters for a given specifications.
5. Understand Multi-rate signal processing Techniques and finite word length effects.

Course Outcomes (COs): At the end of the course, the student would be able to
CO1. Perform analysis on discrete time signals and systems in the frequency domain using DFS, DTFT and Z transform
CO2. Compute the DFT of a given discrete time sequence and plot the spectrum respectively.
CO3. Compute radix-2 FFT for a given sequence.
CO4. Design IIR and FIR filters for given specifications
CO5. Convert from one sampling rate to another. Analyze finite word length effects in digital

UNIT – I

Introduction to Digital Signal Processing: Digital Signal Processing and its benefits. Review of Z-Transforms and its applications

Analysis of Discrete Time Invariant Systems: Causal Linear Time Invariant Systems (LTI), Stability of LTI Systems, LTI Systems characterized by constant coefficient difference equations, Solution of Linear Constant coefficient difference equations.

Frequency analysis of discrete time signals: The Fourier series for discrete time periodic signals (DFS), Discrete Time Fourier Transform (DTFT), and Relation between Z-transform, Discrete Fourier Series and Discrete Time Fourier Transform (DTFT).

UNIT – II

Discrete Fourier Transform (DFT):DFT , properties of DFT and applications, Linear Convolution and Circular convolution, Linear Convolution through circular convolution. Relationship of DFT to other (DTFT and Z-Transforms) transforms, Inverse Discrete Fourier Transform (IDFT), linear convolution of sequences using DFT, Computation of DFT and IDFT.

Fast Fourier Transform (FFT): Efficient computation of DFT: FFT algorithms, direct computation of DFT, Radix-2 FFT algorithms for decimation in time and decimation in frequency. Divide and conquer approach to computation of DFT (Radix-N FFT algorithm).

UNIT – III

Design of IIR digital filters: Structures of IIR systems**:** Direct Form I and II, Cascade form and Parallel form structures. Design of IIR Filters from analog filters: Characteristics of commonly used analog

filters, Analog filter approximations-Butterworth and Chebyshev, IIR filter design by Impulse invariance, Bilinear Transformation method. Frequency transformations.

UNIT – IV

Design of FIR digital filters: Structure of FIR Systems**:** Direct form, Cascade realization and Linear phase realization; Characteristics of linear phase FIR filter and its frequency response; Comparison of IIR and FIR filters; Design of linear phase FIR filters using windows method (Rectangular window, Hanning window, Hamming window, Bartlett window and Kaiser window), frequency-sampling method.

UNIT – V

Introduction to Multirate Digital Signal Processing: Decimation by a factor D, Interpolation by a factor I, Sampling rate conversion by a rational factor I/D. Multistage implementation of sampling rate conversion. Application of multigame signal processing.

Introduction to Finite word length effects in fixed point DSP System.

TEXT BOOKS:

1. Digital signal Processing: Principles, Algorithms and Applications-John G.Proakis, D.G.Manolakis,4thEdition,Pearson/PHI,2009.
2. Digital Signal Processing, S K Mitra,3/e, TMH, 2006.

REFERENCE BOOKS:

1. Discrete time signal Processing-A.V.Oppenheim and R.W.Schaffer,PHI,2009.
2. Digital signal Processing-A Practical Approach-Emmanuel C.Ifeacher, Barrie.W.Jervis, 2nd Edition, Pearson Education,2009.
3. Fundamentals of Digital signal Processing using MAT Lab-Robert J.Schilling, Sandra L.Harris,Thomson,2007.

18EE4204 – UTILIZATION OF ELECTRICAL ENERGY

(Professional Elective - VI)

B.Tech. EEE - IV Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s):18EE3102 – Electrical Machines-II
18EE4101 – Electrical Drives

Course Objectives: Develop ability to

1. Understand the concepts of electric drives and their applications.
2. Understand electric heating concepts and their related applications.
3. Understand various electric welding concepts and related applications.
4. Understand fundamentals of illumination.
5. Understand the concepts of electric traction.

Course Outcomes (COs): At the end of the course, student would be able to

CO1. Apply the knowledge of electric drives.
CO2. Apply the concepts of electric heating.
CO3. Apply various electric welding concepts.
CO4. Calculate and determine the specific illumination level required in a building.
CO5. Calculate various parameters of electric traction.

UNIT – I

Electric Drives: Type of electric drives, choice of motor starting and running characteristics, Speed control, temperature rise. Applications of electric drives. Types of industrial loads, continuous, intermittent and variable loads. Load equalization.

UNIT – II

Electric Heating and Welding: Advantages and methods of electric heating viz. resistance heating, Induction heating and Dielectric heating. Comparison between welding methods. Electric welding, resistance welding, arc welding, and various electric welding equipment used for different applications. Comparison between A.C.and D.C. Welding.

UNIT – III

Illumination: Introduction- terms used in illumination. Laws of illumination, Polar curves Photometry, Integrating sphere Sources of light Discharge lamps, MV and SV lamps, CFL lamps, LED bulbs and LED tube light and their comparison. Basic principles of light control, Types and design of lighting-Floodlighting.

UNIT – IV

Electric Traction-I: System of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor. Methods of electric braking: Plugging, rheostat braking, Regenerative braking. Mechanics of train movement, Speed-time curves for different services- Trapezoidal speed time curves. Quadrilateral speed time curves

UNIT – V

Electric Traction-II: Calculations of tractive effort, power Specific energy consumption for given run. Effect of varying acceleration and braking retardation. Adhesive weight and braking retardation. Adhesive weight and coefficient of adhesion

TEXT BOOKS:

1. "Utilisation of Electrical Power"by Er. R.K. Rajput
2. "Art & Science of Utilization of electrical Energy" – by Partab, DhanpatRai & Sons.

REFERENCE BOOKS:

1. "Utilisation of electric energy" By E. Openshaw Taylor University Press.
3. Generation,Distribution and Utilization of electrical energy, C.L.Wadhawa, New Age International (P) Limited.
4. Utilization of Electrical Power including Electric drives and Electric traction, N.V.Suryanarayana, New Age International (P) Limited.
5. Utilization of Electric Energy, VVL Rao, University Press.

18EE4205 – HVDC TRANSMISSION

(Professional Elective - VI)

B.Tech. EEE - IV Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18EE3201 – Power Electronics
18EE3101 – Power Systems – II

Course Objectives: Develop ability to:

1. Familiarize the importance of HVDC transmission
2. Understand the operation of HVDC converters.
3. Understand the importance of reactive power control of HVDC system.
4. Understand the protection techniques against over current and voltages.
5. Understand the importance of filters in HVDC system.

Course Outcomes (COs): At the end of the course, student would be able to:

CO1. Understand the importance of transmission of power through HVDC links.
CO2. Relate the performance characteristics of 6 pulse,12 pulse circuits and discuss firing angle control.
CO3. Analyze the control of reactive power through HVDC.
CO4. Discuss different protections system used in HVDC system.
CO5. Understand the design of AC tuned and high pass filters.

UNIT – I

Basic Concepts: Comparison of AC &DC transmission, Application of DC transmission system, description of DC transmission system- Types of HVDC Links, typical layout of a HVDC converter station, Planning & Modern trends in D.C. Transmission.

UNIT – II

Analysis of HVDC Converters: Choice of Converter configuration – analysis of Graetz – characteristics of 6 Pulse converter with & without overlap,rectifier and inverter configuration of 12 Pulse converter.

Converter & HVDC System Control: Principles 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.

UNIT – III

Reactive Power Control in HVDC: Reactive Power Requirements in steady state-Conventional control strategies-Alternate control strategies-sources of reactive power-AC Filters – shunt capacitors-synchronous condensers.

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 Fault & 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 & Current harmonics – Effect of Pulse number on harmonics.

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

TEXT BOOKS:

1. HVDC Power Transmission Systems: Technology and system Interactions – by K.R.Padiyar, New Age International (P) Limited, and Publishers.
2. EHVAC and HVDC Transmission Engineering and Practice – S.Rao.Khanna Publishers (1996).

REFERENCE BOOKS:

1. HVDC Transmission – by J.Arrillaga, IET Digital Library, (1998)
2. Direct Current Transmission – by E.W.Kimbark, John Wiley & Sons.
3. Power Transmission by Direct Current – by E.Uhlmann, B.S.Publications.

Geethanjali College of Engineering And Technology (Autonomous)
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18EE4206 – RELIABILITY ENGINEERING
(Professional Elective - VI)

B.Tech. EEE - IV Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18MA1202 – Computational Mathematics
18MA2101 – Complex Variables

Course Objectives: Develop ability to
1. Introduce the basic concepts of reliability, various models of reliability
2. Analyze reliability of various systems
3. Introduce techniques of frequency and duration for reliability evaluation of repairable systems.

Course Outcomes (COs): At the end of the course, student would be able to
CO1. Model various systems applying reliability networks
CO2. Evaluate the reliability of simple and complex systems
CO3. Estimate the limiting state probabilities of repairable systems
CO4. Apply various mathematical models for evaluating reliability of irreparable systems.

UNIT - I

Basic probability theory: Elements of probability, probability distributions, Random variables, Density and Distribution functions- Binomial distribution- Expected value and standard deviation - Binomial distribution, Poisson distribution, normal distribution, exponential distribution, Wei bull distribution.

Definition of Reliability: Definition of terms used in reliability, Component reliability, Hazard rate, derivation of the reliability function in terms of the hazard rate. Hazard models - Bath tub curve, Effect of preventive maintenance. Measures of reliability: Mean Time to Failure and Mean Time Between Failures.

UNIT – II

Network Modeling and Evaluation Of Simple Systems: Basic concepts- Evaluation of network Reliability / Unreliability - Series systems, Parallel systems- Series-Parallel systems- Partially redundant systems- Examples.

Network Modeling and Evaluation of Complex systems: Conditional probability method - tie set, Cut set approach- Event tree and reduced event tree methods- Relationships between tie and cut sets- Examples.

UNIT – III

Time Dependent Probability: Basic concepts- Reliability function f(t). F(t), R(t) and h(t) - Relationship between these functions.

Network Reliability Evaluation Using Probability Distributions: Reliability Evaluation of Series systems, Parallel systems – Partially redundant systems- determination of reliability measure- MTTF for series and parallel systems – Examples.

UNIT – IV

Discrete markov chains: Basic concepts- Stochastic transitional probability matrix- time dependent probability evaluation- Limiting State Probability evaluation- Absorbing states – Application.
Continuous Markov Processes: Modeling concepts- State space diagrams- Unreliability evaluation of single and two component repairable systems

UNIT - V

Frequency and duration techniques: Frequency and duration concepts, application to multi state problems, Frequency balance approach.

Approximate system reliability evaluation: Series systems – Parallel systems- Network reduction techniques- Cut set approach- Common mode failures modeling and evaluation techniques –Examples.

TEXT BOOKS:

1. Roy Billinton and Ronald N Allan, Reliability Evaluation of Engineering Systems, Plenum Press.
2. E.Balagurusamy, Reliability Engineering by Tata McGraw-Hill Publishing Company Limited

REFERENCE BOOKS:

1. Reliability Engineering: Theory and Practice by Alessandro Birolini, Springer Publications.
2. An Introduction to Reliability and Maintainability Engineering by Charles Ebeling, TMH Publications.
3. Reliability Engineering by Elsayed A. Elsayed, Prentice Hall Publications..

18EC4207 - VLSI TECHNOLOGY

(Professional Elective - VI)

B.Tech. EEE - IV Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 18PH1201 – Semiconductor Devices
18EC2102 – Digital Design

Course Objectives: Develop ability to

1. Understand MOS technology and MOS transistor electrical properties.
2. Understand MOS Circuit Design Processes and layout rules.
3. Understand architectural aspects of VLSI Subsystem.
4. Understand the principles of data path and array subsystems.
5. Understand principles of CMOS testing.

Course Outcomes: At the end of the course, student would be able to:

CO 1: Explain MOS technology of NMOS, PMOS, CMOS and BiCMOS.
CO 2: Design stick diagrams and draw the layout of a logic circuit.
CO 3: Analyze the architectural issues involved in subsystem.
CO 4: Explain building blocks of data path subsystems and analyze simple memories using MOS transistors.
CO 5: Explain the CMOS test principles.

UNIT –I

Introduction to MOS Technology: IC Era, MOS VLSI Technology, Basic MOS Transistors, nMOS Fabrication, CMOS Fabrication, BiCMOS Technology

Basic Electrical Properties: Basic Electrical Properties of MOS Circuits: I_{ds}-V_{ds} relationship, Threshold Voltage, g_m, g_{ds}, Figure of merit ω_o. NMOS Inverter: $Z_{p.u}/Z_{p.d}$ ratio, Alternate forms of pull-up. CMOS Inverter.

UNIT -II

MOS Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Lambda based design Rules and Layout, 2μm CMOS Design rules for wires, Contacts and Transistors; Layout Diagrams for NMOS and CMOS Inverters; CMOS Logic Gates and compound gates, Scaling of MOS circuits.

UNIT –III

Subsystem Design: Architectural issues**,** Switch logic: Pass transistors and Transmission gates; Alternate gate circuits: Pseudo nMOS inverter and Domino Logic; Inverter Delays, Driving large capacitive loads, wiring capacitance, Fan–in and Fan–out.

UNIT -IV

Data path Subsystems: Introduction, Adders, ALU, One/Zero Detector, Shifter and Multipliers

Array Subsystems: Qualitative analysis of 6T SRAM, DRAM, NAND ROM, Serial Access Memories and Content-addressable memory

UNIT -V

CMOS Testing: Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques.

TEXT BOOKS:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Douglas A.Pucknell, Sholeh Eshraghian PHI, 2005 Edition
2. CMOS VLSI Design – A Circuits and Systems Perspective, Neil H. E Weste, David Harris, Ayan Banerjee, 3rd Ed, Pearson, 2009.

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011
2. VLSI Design- K.Lal Kishore, V. S. V. Prabhakar, I.K International, 2009.

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18CE4241 – DISASTER MANAGEMENT
(Open Elective – III)

B.Tech. EEE - IV Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None.

Course objectives: Develop ability to
1. Gain knowledge on disasters and assess their impact.
2. Understand disaster management mechanisms.
3. Understand capacity building concepts and planning of disaster managements.
4. Assess various coping strategies during disasters.
5. Understand disaster management acts and policies in India.

Course Outcomes: At the end of the course, student would be able to
CO1. Explain the basic concepts of disasters, hazards, risks and vulnerabilities.
CO2. Develop disaster management mechanisms to protect society.
CO3. Perform capacity assessment and explain legislative support at state and national levels.
CO4. Develop coping strategies at the time of disasters.
CO5. Prepare disaster risk reduction and management plans.

UNIT–I
Understanding Disaster: Concept of Disaster – Different approaches – Concept of Risk – Levels of Disasters – Disaster Phenomena and Events (Global, national and regional)
Hazards and Vulnerabilities: 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 Reducing Risk – 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 process – 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. Disaster Management, Dr. Mrinalini Pandey, Wiley India Pvt Ltd., 2014.
2. Disaster Science and Management, Tushar Bhattacharya, McGraw Hill Education, 2015.
3. Manual on Disaster Management in India, Ministry of Home Affairs, Government of India https://www.undp.org/content/dam/india/docs/disaster_management_in_india.pdf

REFERENCE BOOKS:

1. Disaster Mitigation: Experiences and Reflections, PardeepSahni, PHI Learning, 2010.
2. Disaster Management Global Challenges and Local Solutions, Rajib, S and Krishna Murthy, R.R, Universities Press Hyderabad, 2012.
3. Earth and Atmospheric Disaster Management: Nature and Manmade,NavalePandharinath& C.K. Rajan, B.S. Publications, Hyderabad, 2009.
4. Manual on National Disaster Management Plan, National Disaster Management Authority, Ministry of Home affairs, Government of India (http://ndma.gov.in/images/policyplan/dmplan/National%20Disaster%20Management%20Plan%20May%202016.pdf) **https://ndma.gov.in/images/pdf/NDMP-2018-Revised-Draft-1-2018OCT16-A.pdf**

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18ME4243-PRINCIPLES OF AUTOMOBILE ENGINEERING
(Open Elective-III)

B.Tech. EEE - IV Year II Sem.

L	T	P/D	C
3	-	-/-	3

Pre-requisites: None

Course Objectives: Develop ability to,

1. Introduction to Engineering analysis of the automobiles and their sub systems.
2. Applications of engineering principles to automotive design.
3. Improves ability to understand the different types of engines and automobile bodies.
4. Familiarization with the automotive industry and its terminology.
5. Develops an idea of utilization of resources duly reducing emission levels for achieving eco-friendly environment.

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

CO1. Demonstrate the basic lay-out of an automobile
CO2. Distinguish between SI and CI engine's fuel system and cooling systems
CO3. Classify the principles of fuel ignition systems
CO4. Infer and select transmission system of an automobile
CO5. Differentiate the steering systems

UNIT – I

Introduction: History of Automobiles, Classification of Automobiles. Chassis and body building, Engine Terminology, Classification of Engines

UNIT – II

Fuel System: spark Ignition engines-Fuel tank, fuel filter, fuel pump, air cleaner/filter, carburetor types, injection of petrol engines. Compression Ignition engines, Fuel Injection System- air & solid injection system, Pressure charging of engines, super charging and turbo charging

Cooling System : Cooling Requirements, Air Cooling, Liquid Cooling, Thermo, water and Forced Circulation System, Radiators, Cooling Fan - water pump, thermostat, evaporating cooling, pressure sealed cooling, antifreeze solutions.

UNIT – III

Ignition System: Function of an ignition system, constructional features of storage, battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, Battery ignition system

UNIT – IV

Transmission System: Clutch principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, gear boxes, types. Propeller shaft, Hotch Kiss drive, Torque tube drive, universal joint, differential, live and dead axles, wheels and tyres.

Braking System: Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder, tandem master cylinder, Requirement of brake fluid, Pneumatic and vacuum brakes.

UNIT – V

Steering System: Types of steering mechanism, Ackerman steering mechanism, Davis steering mechanism.

TEXT BOOKS:

1. Kirpal Singh, Automobile Engineering, Vol.1 and 2, Standard Publishers, New Delhi, 2003.
2. A Text Book of Automobile Engineering by R K Rajput. Laxmi Publications.

REFERENCE BOOKS:

1. Automotive Engines / Srinivasan
2. A Text Book of Automobile Engineering By Khalil U Siddiqui New Age International
3. Automobile Engineering / William H Crouse
4. A Text Book Automobile Engineering–Manzoor,. Nawazish Mehdi & .Yosuf Ali, Frontline Publications.

Geethanjali College of Engineering And Technology (Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18EC4244 - BIOMEDICAL INSTRUMENTATION
(Open Elective- III)

B.Tech. EEE - IV Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisites: None

Note: No detailed mathematical treatment is required and only elementary treatment is sufficient.

Course Objectives: Develop ability to
1. Learn the basics of human physiology
2. Understand the basics of bio-medical transducers and recorders.
3. Understand the applications of measuring, recording and monitoring instruments.
4. Understand the concepts of various medical instruments and supporting systems.

Course Outcomes: At the end of the course, student would be able to
CO 1: Explain the functioning of different human physiological systems.
CO 2: Explain the operations of transducers and recorders used for bio-medical applications.
CO 3: Explain the principles of medical imaging systems.
CO 4: Explain the principles of monitoring instruments used for bio-medical application
CO 5: Explain the need for health supporting systems

UNIT – I
Human physiology: Introduction to generalized medical instrumentation system, components of instrumentation system, physiological system of human body, cardiovascular system. Respiratory system, Nervous system, generation of bioelectric potentials, Action potential, resting potential, Neuronal communication.

UNIT – II
Bio- potential electrodes, transducers and recorders: The electrode – electrolyte interface, Polarization, Ag/Agcl Electrodes, Body surface electrodes, Internal Electrodes. Transducers in general, Pressure Transducers, Temperature transducers, pulse sensors, Basic recording systems.

UNIT – III
Medical imaging systems: Basics of medical imaging systems, block diagrams and applications of - X-ray machine, Computer Tomography, Magnetic Resonance Imaging systems, Ultrasonic Imaging systems.

UNIT – IV
Monitoring systems: Basic principles of -Stethoscope, BP measuring Instrument, Electrocardiography(ECG), Electroencephalography(EEG) and Electromyography(EMG) recorders,

UNIT – V
Supporting systems: Basic principles of Pacemaker system, Transcutaneous Electrical Nerve stimulation (TENS), surgical diathermy, Heart lung machine, Hemo Dialysis, Lithotripsy.

TEXT BOOKS:
1. Cromwell, “Bio-Medical Instruments and Measurements”, Prentice Hall of India, 1990.
2. Dr.Arumugam, “Bio-Medical Instrumentation”, Anuradha Agencies, 1994.

REFERENCE BOOKS:

1. Prof.Venkataram.S.K, "Bio-Medical Electronics & Instrumentation", Galgotia Publications, 2000.
2. John. Can. Brown, "Introduction to Bio Medical Equipment Technology", Pearson Education of ASIA, 2001.
3. Khandpur.R.S, "Hand book of Bio-Medical Instrumentation", Tata McGraw –Hill, 1987

18CS4245 - DATABASE SYSTEMS
(Open Elective- III)

B.Tech. EEE - IV Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisites: 18CS1201 - Data Structures

Course Objectives: Develop ability to
1. Understand the basic concepts and the applications of database systems.
2. Master the basics of SQL and construct queries using SQL.
3. Apply relational database design principles.
4. Understands the basic issues of transaction processing and concurrency control.
5. Know the needs of database storage structures and access techniques.

Course Outcomes: At the end of the course, student would be able to:
CO1. Demonstrate the basic elements of a relational database management system.
CO2. Design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data.
CO3. Apply normalization for the development of application software.
CO4. Implement Transaction and Query processing techniques for data storage and retrieval.
CO5. Implement data storage structures and access through special databases

UNIT - I

Introduction: Database System Applications, Purpose of Database Systems, View of Data, Database Languages – DDL, DML, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Database Users and Administrators, History of Database Systems.

Introduction to Data base design: Database Design and ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model

UNIT II

Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design: ER to Relational, Introduction to Views, Destroying /Altering Tables and Views.

Relational Algebra: Express Preliminaries, Relational Algebra.

Basic Structure of SQL Queries, Set Operations, Null Values, Additional Basic Operations, Aggregate Functions, Nested Sub Queries, Views, Joins

UNIT - III

Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependencies.

Normal Forms – INF, 2NF, 3NF, BCNF, Multi valued dependencies – 4NF, 5NF.

UNIT - IV

Transaction Management: Transactions, Transaction Concept, A Simple Transaction Model, Transaction Atomicity and Durability, Transaction Isolation and consistency, Serializability.

Concurrency Control: Lock–Based Protocols, Multiple Granularity, deadlock handling Timestamp-Based Protocols, Validation-Based Protocols, Recovery Systems.

UNIT - V

Indexing and Hashing: Basic Concepts, Ordered Indices, B+ Tree Index Files, B Tree Index Files, Multiple-Key Access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices.

Special Databases: Data analysis, data mining, data warehousing, spatial and geographical, multimedia database, mobility and personal database, distributed information system. World Wide Web, OLAP

TEXT BOOK(S)

1. Database System Concepts, Abraham Silberschatz, Henry. F. Korth, S. Sudarshan, McGraw Hill Education(India) Private Limited , 6th edition.

REFERENCE BOOK(S)

1. Database Systems, 6th edition, R Elmasri, Shamkant B.Navathe, Pearson Education.
2. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning.
3. Introduction to Database Management, M. L. Gillenson and others, Wiley Student Edition.
4. Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group.
5. Introduction to Database Systems, C. J. Date, Pearson Education.

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Cheeryal (V), Keesara (M), Medchal Dist., Telengana-501301

18MB4246-ENTREPRENEURSHIP
(Open Elective- III)

B.Tech. EEE - IV Year II Sem.

L	T	P/D	C
3	-	-/-	3

Pre requisites: None

Course Objectives: Develop ability to
1. Understand the mindset of the entrepreneurs.
2. Analyze the financial aspects of establishing an enterprise.
3. Learn entrepreneurial activities and determine strategies for launching.
4. Identify the challenges of entrepreneurship and develop an idea on the entrepreneurial Frame work.
5. Apply strategic perspectives in entrepreneurship.

Course Outcomes (COs): At the end of the course, student would be able to
CO1. Explore and identify the entrepreneurial traits.
CO2. Identify various funding agencies and role of IPR.
CO3. Imagine and identify opportunities to launch new ventures.
CO4. Address entrepreneurial challenges.
CO5. Develop strategies for bringing stability and growth in business.

UNIT-I

Introduction to entrepreneurship: meaning, importance, entrepreneurship characteristics, women entrepreneurs, classifications of entrepreneurs, myths of entrepreneurship, qualities of entrepreneurship, competencies, attitude function and nature of forms of entrepreneurship.

UNIT-II

Promotion and financial aspects of entrepreneurship: Idea generation- opportunities- SWOT analysis, patents and trademark, intellectual property rights, source of capital, debt capital, seed capital, venture capital- informal agencies in financing entrepreneurs. Government grants and subsidies, types of investors and private offerings.

UNIT-III

Launching entrepreneurial ventures: opportunities identification- entrepreneurial imagination and creativities – the nature of the creativity process innovation and entrepreneurial- methods to initiate venture creating, new ventures-acquiring and established entrepreneurial venture, franchising hybrid-disadvantage of franchising.

UNIT-IV

Legal challenges of entrepreneurship: Intellectual property protection patents, copy rights-trademarks and trade secret. Avoiding pitfalls-formulation of the entrepreneurial plan-the challenges of new venture startups-poor financial understanding-critical factors for new venture development, the evaluation process, feasibility criteria approach.

UNIT-V

Strategic perspectives in entrepreneurship: Strategic planning-strategic actions-strategic positioning-business stabilization-building the adoptive firms-understanding the growth stage unique managerial concern of growing ventures.

TEXT BOOKS:

1. D F Kuratko and T V Rao "Entrepreneurship- A South - Asian Perspective "Cengage Learning, 1/e, 2012.
2. Vasanth Desai "Small Scale industries and entrepreneurship" Himalaya Publishing 2012.

REFERENCE BOOKS:

1. B. Janakiram and M. Rizwana "Entrepreneurship Development: Text & Cases, Excel Books, 2011.
2. Stuart Read, Effectual Entrepreneurship, Routledge, 2013.
3. Nandan H, Fundamentals of Entrepreneurship, PHI, 2013.