ACADEMIC REGULATIONS,
COURSE STRUCTURE
and
DETAILED SYLLABUS
R22

B.Tech – Electrical & Electronics Engineering

B.Tech - Regular Four Year Degree Programme
(For batches admitted from the academic year 2021 - 2022)

Holy Mary Institute of Technology & Science
Bogaram (V), Keesara (M), Medchal (Dist) - 501 301

FOREWORD

The autonomy is conferred on Holy Mary Institute of Technology & Science by UGC, based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own **curriculum, examination system and monitoring mechanism**, independent of the affiliating University but under its observance.

Holy Mary Institute of Technology & Science is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, if not improving upon the standards and ethics for which it has been striving for more than a two decades in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, in accordance with the vision and mission of the college in order to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought, at appropriate time with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The Cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the college and brighter prospects of engineering graduates.

PRINCIPAL

ACADEMIC REGULATIONS

B. Tech. - Regular Four Year Degree Programme
(For batches admitted from the academic year 2022-23)
&
B. Tech. - Lateral Entry Scheme
(For batches admitted from the academic year 2023-24)

For pursuing four year Under Graduate Degree Programme of study in Engineering & Technology (UGP in E&T) offered by Holy Mary Institute of Technology & Science under Autonomous status is herein referred to as HITS (Autonomous):

All the rules specified herein approved by the Academic Council will be in force and applicable to students admitted from the Academic Year 2022-23 onwards. Any reference to "Institute" or "College" in these rules and regulations shall stand for Holy Mary Institute of Technology & Science (Autonomous).

All the rules and regulations, specified hereafter shall be read as a whole for the purpose of interpretation as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, the Principal, Holy Mary Institute of Technology & Science shall be the chairman Academic Council.

1. ADMISSION

1.1. Admission into first year of four year B. Tech. degree programmes of study in Engineering

1.1.1. Eligibility:

A candidate seeking admission into the first year of four year B. Tech. degree Programmes should have:

(i) Passed either Intermediate Public Examination (I.P.E) conducted by the Board of Intermediate Education, Telangana, with Mathematics, Physics and Chemistry as optional subjects or any equivalent examination recognized by Board of Intermediate Education, Telangana or a Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Telangana or equivalent Diploma recognized by Board of Technical Education for admission as per guidelines defined by the Regulatory bodies of Telangana State Council for Higher Education (TSCHE) and AICTE.

(ii) Secured a rank in the EAMCET examination conducted by TSCHE for allotment of a seat by the Convener, EAMCET, for admission.

1.1.2. Admission Procedure:

Admissions are made into the first year of four year B. Tech. Degree Programmes as per the stipulations of the TSCHE.

(a) Category 'A' seats are filled by the Convener, TSEAMCET.
(b) Category 'B' seats are filled by the Management.

1.2 Admission into the second year of four year B. Tech. degree Program in Engineering

1.2.1 Eligibility:

A candidate seeking admission under lateral entry into the II year I Semester B. Tech. degree Programmes should have passed the qualifying exam (B.Sc. Mathematics or Diploma in concerned course) and based on the rank secured by the candidate at Engineering Common Entrance Test ECET (FDH) in accordance with the instructions received from the Convener, ECET and Government of Telangana.

1.2.2 Admission Procedure:

Admissions are made into the II year of four year B. Tech. degree Programmes through Convener, ECET (FDH) against the sanctioned strength in each Programmes of study as lateral entry students.

2. PROGRAMMES OFFERED

Holy Mary Institute of Technology & Science, an autonomous college affiliated to JNTUH, offers the following B.Tech Programmes of study leading to the award of B. Tech degree under the autonomous scheme.

1) B.Tech – Civil Engineering
2) B.Tech – Computer Science and Engineering
3) B.Tech – Computer Science and Engineering (Artificial Intelligence & Machine Learning)
4) B.Tech – Computer Science and Engineering (Data Science)
5) B.Tech – Computer Science and Engineering (IoT)
6) B.Tech – Electronics and Communication Engineering
7) B.Tech – Electrical & Electronics Engineering
8) B.Tech – Mechanical Engineering
9) B.Tech – Artificial Intelligence (AI) and Data Science

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

3. DURATION OF THE PROGRAMMES

3.1 Normal Duration

3.1.1 B. Tech. degree programme extends over a period of four academic years leading to the Degree of Bachelor of Technology (B.Tech.) of the Jawaharlal Nehru Technological University Hyderabad.

3.1.2 For students admitted under lateral entry scheme, B. Tech. degree programme extends over a period of three academic years leading to the Degree of Bachelor of Technology (B. Tech.) of the Jawaharlal Nehru Technological University Hyderabad.

3.2 Maximum Duration

3.2.1 The maximum period within which a student must complete a full-time academic programme is 8 years for B. Tech. If a student fails to complete the academic programme within the maximum duration as specified above, he shall forfeit the seat in B.Tech and his admission shall stand cancelled.

3.2.2 For students admitted under lateral entry scheme in B. Tech. degree programme, the maximum period within which a student must complete a full-time academic programme is 6 years. If a student fails to complete the academic programme within the maximum duration as specified above, he shall forfeit the seat in B.Tech and his admission shall stand cancelled.

3.2.3 The period is reckoned from the academic year in which the student is admitted first time into the degree Programme.

4. AWARD OF B.Tech DEGREE

A student will be declared eligible for the award of the B.Tech degree if he/she fulfils the following academic regulations:

4.1 The candidate shall pursue a course of study as specified in section 3.1 and 3.2.

4.2 The candidate shall register for **160** credits and secure **160** credits (Excluding Mandatory Courses).

5. PROGRAMME STRUCTURE

5.1 UGC/AICTE specified Definitions/ Descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations/ Norms, which are listed below.

Semester Scheme:

Each UGP is of 4 Academic Years (8 Semesters), each year divided into two Semesters of 22 weeks (≥90 working days), each Semester having - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as denoted by UGC, and Curriculum/Course Structure as suggested by AICTE are followed.

5.1.1 The B.Tech. Programme of Holy Mary Institute of Technology & Science is Semester pattern, with 8 Semesters constituting 4 Academic Years, each Academic Year having TWO Semesters (First/Odd and Second/Even Semesters). Each Semester shall be of 16-18 Weeks duration with a minimum of 90 Instructional Days per Semester.

5.1.2 Credit Courses:

a) All Courses are to be registered by a student in a Semester to earn Credits. Credits shall be assigned to each Subject/ Course in a L: T: P: C (Lecture Periods: Tutorial Periods: Practical Periods : Credits) Structure, based on the following general pattern .

- One Credit - for One hour / Week / Semester for Theory / Lecture(L) / Tutorial)T) Courses; and
- One Credit - for Two hours/Week/Semester for Laboratory/Practical (P) Courses, Mini Project...
- Mandatory Courses Credits shall not be counted for credit requirements for award of degree. However all the mandatory courses have to be passed by the student.

5.1.3 Course Classification:

All Courses offered for the UGP are broadly classified as:

- **Basic Science Courses (BSC):** Includes Mathematics, Physics, Chemistry, Biology etc.
- **Engineering Science Courses (ESC):** Courses include Materials, Workshop, Basics of Electrical/Electronics/ Mechanical/Computer Science & Engineering, Engineering Graphics, Instrumentation, Engineering Mechanics, Instrumentation etc.
- **Humanities and Social Science including Management Courses (HSMC):** Courses include English, Communication skills, Management etc.
- **Professional Core Courses (PCC):** Relevant to the chosen specialization/branch.
- **Professional Elective Courses (PEC):** Relevant to the chosen specialization/ branch offered as electives.
- **Open Elective Courses (OEC):** Other technical and/or emerging subject areas offered in the College by the Departments of Engineering, Science and Humanities.
- **Mandatory Course:** Course work on peripheral subjects in a programme, wherein familiarity considered mandatory. To be included as non-Credit, Mandatory Courses, with only a pass in each required to qualify for the award of degree from the concerned institution.
- **Project Work:** and/or internship in industry or elsewhere, seminar.
- **MOOCS –** Massive Open Online Courses in a variety of disciplines available at both introductory and advanced levels, accessible from e-resources in India and abroad.

5.1.4 Course Nomenclature:

The Curriculum Nomenclature or Course-Structure Grouping for the each of the UGP E&T (B.Tech Degree Programme) is as listed below.

S. No	Broad Course Classification	Course Group/ Category	Course Description	Credits
1)	Foundation Courses (FnC)	BSC – Basic Sciences Courses	Includes - Mathematics, Physics and Chemistry Subjects	25
2)		ESC - Engineering Sciences Courses	Includes fundamental engineering subjects.	24
3)		HSMC – Humanities and Social Sciences including Management	Includes subjects related to Humanities, Social Sciences and Management.	12
4)	Core Courses (CoC)	PCC – Professional Core Courses	Includes core subjects related to the Parent Discipline/ Department/ Branch of Engg.	57
5)	Elective Courses (ElC)	PEC– Professional Elective Courses	Includes Elective subjects related to the Parent Discipline / Department / Branch of Engg.	18
6)		OEC – Open Elective Courses	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the Parent Discipline/ Department / Branch of Engg.	09
7)	Core Courses	Project Work	Major Project.	15
8)		Industrial Training/ Mini- Project	Industrial Training/ Internship/ Mini-Project.	
9)		Seminar	Seminar / Colloquium based on core contents related to Parent Discipline/ Department/ Branch of Engg.	
10)	Mandatory Courses (MC)	-	Mandatory Courses (non-credit)	--
Total Credits for UGP (B. Tech)Programme				**160**

- Minor variations as per AICTE / UGC guidelines

6. COURSE REGISTRATION

6.1 A 'Faculty Advisor or Counselor' shall be assigned to each student, who advises him/her about the UGP, its Course Structure and Curriculum, Choice/Option for Subjects/Courses, based on his/her competence, progress, pre-requisites and interest.

6.2 Academic Section of the College invites 'Registration Forms' from students prior (before the beginning of the Semester), ensuring 'DATE and TIME Stamping'. The Registration Requests for any 'CURRENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examinations) of the 'PRECEDING SEMESTER'.

6.3 A Student can apply for Registration, which includes approval from his faculty advisor, and then should be submitted to the College Academic Section through the Head of Department (a copy of the same being retained with Head of Department, Faculty Advisor and the Student).

6.4 A student may be permitted to register for his/her course of CHOICE with a Total of prescribed credits per Semester (permitted deviation being±12%), based on his PROGRESS and

SGPA/CGPA, and completion of the 'PRE-REQUISITES' as indicated for various courses in the Department Course Structure and Syllabus contents.

6.5 Choice for 'additional Courses' must be clearly indicated, which needs the specific approval and signature of the Faculty Advisor/Counselor.

6.6 If the Student submits ambiguous choices or multiple options or erroneous (incorrect) entries during Registration for the Course(s) under a given/specified Course Group/ Category as listed in the Course Structure, only the first mentioned Course in that Category will be taken into consideration.

6.7 Dropping of Courses or changing of options may be permitted, ONLY AFTER obtaining prior approval from the Faculty Advisor, 'within 15 Days of Time' from the commencement of that Semester. Course Options exercised through Registration are final and CAN NOT be changed, and CAN NOT be inter-changed; further, alternate choices will also not be considered. However, if the Course that has already been listed for Registration (by the Head of Department) in a Semester could not be offered due to any unforeseen or unexpected reasons, then the Student shall be allowed to have alternate choice - either for a new Subject (subject to offering of such a Subject), or for another existing Subject (subject to availability of seats), which may be considered. Such alternate arrangements will be made by Head of the Department, with due notification and time-framed schedule, within the FIRST WEEK from the commencement of Class-work for that Semester.

7. COURSES TO BE OFFERED

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

7.2 Courses may be offered to the Students, only if minimum of 20 students ($1/3^{rd}$ of the section strength) opt for it.

7.3 More than ONE TEACHER may offer the SAME SUBJECT (Lab/Practical's may be included with the corresponding Theory Subject in the same Semester) in any Semester. However, selection choice for students will be based on - 'CGPA Basis Criterion' (i.e., the first focus shall be on early Registration in that Semester, and the second focus, if needed, will be on CGPA of the student).

7.4 If more entries for Registration of a Subject come into picture, then the concerned Head of the Department shall take necessary decision, whether to offer such a Subject/Course for TWO (or multiple) SECTIONS or NOT.

7.5 OPEN ELECTIVES will be offered by a department to the students of other departments.

8. ATTENDANCE REQUIREMENTS

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

b. Condoning of shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each Semester may be granted by the College Academic Committee on genuine and valid grounds, based on the student's representation with supporting evidence by following the govt. rules in vogue.

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

d. Shortage of Attendance below 65% in aggregate shall in No case be condoned.

e. A student shall not be promoted to the next Semester unless he/she satisfies the attendance requirements of the current Semester. The student may seek readmission for the Semester when offered next. He / She shall not be allowed to register for the subjects of the Semester while he/she is in detention. A student detained due to shortage of attendance, will have to repeat that Semester when offered next. The academic regulations under which the student has been readmitted shall be applicable.

f. Students whose attendance is less than 75% are not entitled to get the scholarship / fee reimbursement in any case as per the TS Govt. Rules in force.

9. ACADEMIC REQUIREMENTS FOR PROMOTION / COMPLETION OF REGULAR B.TECH PROGRAMME COURSE STUDY.

9.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course, if student secures not less than 35% (14 marks out of 40 marks) in the internal examinations, not less than 35% (21 marks out of 60 marks) in the semester end examination, and a minimum of 40% (40 marks out of 100 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 'C' grade or above in that subject/ course.

9.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Real-time Research Project (or) Field Based Research Project (or) Industry Oriented Mini Project (or) Internship (or) Seminar, if the student secures not less than 40% marks (i.e. 40 out of 100 allotted marks) in each of them. The student is deemed to have failed, if he (i) does not submit a report on Industry Oriented Mini Project/Internship, or (ii) not make a presentation of the same before the evaluation committee as per schedule, or (iii) secures less than 40% marks in Real-time Research Project (or) Field Based Research Project (or) Industry Oriented Mini Project (or) Internship evaluations**.**

9.3 A Student will not be promoted from I Year to II Year, unless he/she fulfills the Attendance and Academic Requirements and secure a Total 50% of Credits up to I Year II Semester from all the relevant regular and supplementary examinations.

9.4 A Student will not be promoted from II Year to III Year, unless he/she fulfills the Attendance and Academic Requirements and secure a Total 60% of Credits up to II Year II Semester from all the relevant regular and supplementary examinations.

9.5 A Student will not be promoted from III Year to IV Year, unless he/she fulfills the attendance and Academic Requirements and secure a Total 60% of Credits up to III Year II Semester, from all the regular and supplementary examinations.

9.6 After securing the necessary 160 Credits as specified for the successful completion of the entire UGP, resulting in 160 Credits for UGP performance evaluation, i.e., the performance of the Student in these 160 Credits shall alone be taken into account for the calculation of the final CGPA.

If a Student registers for some more 'extra courses' (in the parent Department or other Departments/Branches of Engg.) other than those listed courses Totaling to 160 Credits as specified in the Course Structure of his/her Department, the performances in those 'extra courses' (although evaluated and graded using the same procedure as that of the required 160 Credits) will not be taken into account while calculating the SGPA and CGPA. For such 'extra courses' registered, % marks and Letter Grade alone will be indicated in the Grade Card, as a performance measure, subject to completion of the Attendance and Academic Requirements as stated in items 8 and 9.1-9.5.

9.7 Students who fail to earn minimum of 160 Credits as per the Course Structure, and as indicated above, within 8 Academic Years from the Date of Commencement of their I Year shall forfeit their seats in B.Tech Programme and their admissions shall stand cancelled. **There is NO exemption of credits in any case.**

When a Student is detained due to shortage of attendance/lack of credits in any Semester, he may be re-admitted into that Semester, as and when offered. However the regulations at the time of admissions hold good.

10. EVALUATION - DISTRIBUTION AND WEIGHTAGE OF MARKS

10.1 The performance of a student in each Semester shall be evaluated Course-wise (irrespective of Credits assigned) with a maximum of 100 marks for Theory. The B.Tech Project Work (Major Project) will be evaluated for 100 marks in Phase-I and 100 Marks in Phase-II.

10.2 For all Theory Courses as mentioned above, the distribution shall be 40 marks for CIE, and 60 marks for the SEE.

10.3 Continuous Internal Evaluation:

In CIE, for theory subjects, during a semester, there shall be two mid-term examinations. Mid-Term examination for 30 marks, consist of two parts.

i) Part – A for 10 marks,
- ✓ Part - A: Objective/quiz paper for 10 marks. (The objective/ quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 10 marks.)

ii) Part – B for 20 marks with a total duration of 2 hours as follows:
- ✓ Part - B : Descriptive paper for 20 marks (The descriptive paper shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks.)

iii) **The remaining 10 marks of Continuous Internal Evaluation are distributed as**
a) Assignment for 5 marks (Average of 2 Assignments each for 5 marks)
b) Subject Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the concerned subject for 5 marks.

10.4 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.

10.4.1 Five (5) marks are allocated for assignments (as specified by the subject teacher concerned). The first assignment should be submitted before the conduct of the first mid-term examination, and the second assignment should be submitted before the conduct of the second mid-term examination. The average of the two assignments shall be taken as the final marks for assignment (for 5 marks).

Subject Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the concerned subject for 5 marks before II Mid-Term examination.

10.4.2 The Student, in each subject, shall have to earn 35% of marks (i.e. 14 marks out of 40 marks) in CIE, 35% of marks (i.e. 21 marks out of 60) in SEE and Overall 40%of marks (i.e. 40 marks out of 100 marks) both CIE and SEE marks put together.

The student is eligible to write Semester End Examination of the concerned subject, if the student scores ≥ 35% (14 marks) of 40 Continuous Internal Examination (CIE) marks.

In case, the student appears for Semester End Examination (SEE) of the concerned Subject but not scored minimum 35% of CIE marks (14 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled inspite of appearing the SEE.

There is NO Computer Based Test (CBT) for R22 regulations.

10.5 Practical Examination Evaluation:

10.5.1 For practical subjects there shall be a Continuous Internal Evaluation (CIE) during the semester for 40 marks and 60 marks for semester end examination. Out of the 40 marks for internal evaluation:

1. A write-up on day-to-day experiment in the laboratory (in terms of aim, components/procedure, expected outcome) which shall be evaluated for 10 marks.
2. **10 marks for viva-voce (**or) tutorial (or) case study (or) application (or) poster Presentation of the course concerned.
3. Internal practical examination conducted by the laboratory teacher concerned shall be evaluated for 10 marks.
4. The remaining 10 marks are for Laboratory Project, which consists of the Design (or) Software / Hardware Model Presentation (or) App Development (or) Prototype Presentation submission which shall be evaluated after completion of laboratory course and before semester end practical examination.

The Semester End Examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the cluster / other colleges which will be decided by the examination branch of the institution.

In the Semester End Examination held for 3 hours, total 60 marks are divided and allocated as shown below:

1. 10 marks for write-up
2. 15 for experiment/program
3. 15 for evaluation of results
4. 10 marks for presentation on another experiment/program in the same laboratory course
5. 10 marks for viva-voce on concerned laboratory course.

10.5.2 The Student, in each subject, shall have to earn **35% of marks** (i.e. 14 marks out of 40 marks) in CIE, **35% of marks** (i.e. 21 marks out of 60) in SEE and Overall 40% of marks (i.e. **40 marks out of 100 marks**) both CIE and SEE marks put together.

The student is eligible to write Semester End Examination of the concerned subject, if the student scores ≥ 35% (14 marks) of **40 Continuous Internal Examination (CIE) marks.**

In case, the student appears for Semester End Examination (SEE) of the concerned Subject but not scored minimum **35% of CIE marks** (14 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled inspite of appearing the SEE.

10.6 The evaluation of courses having ONLY internal marks in I-Year I Semester and II Year II Semester is as follows:

10.6.1 I Year I Semester course (ex., Elements of CE/ME/EEE/ECE/CSE): The internal evaluation is for 50 marks and it shall take place during I Mid-Term examination and II Mid-Term examination. The average marks of two Mid-Term examinations are the final for 50 marks. Student shall have to earn 40%, i.e 20 marks out of 50 marks from average of the two examinations. There shall be NO external evaluation. The student is deemed to have failed, if he (i) is absent as per schedule, or (ii) secures less than 40% marks in this course.

10.6.2 II Year II Semester Real-Time (or) Field-based Research Project course: The internal evaluation is for 50 marks and it shall take place during I Mid-Term examination and II Mid-Term examination. The average marks of two Mid-Term examinations are the final for 50 marks. Student shall have to earn 40%, i.e 20 marks out of 50 marks from average of the two examinations. There shall be NO external evaluation. The student is deemed to have failed, if he (i) does not submit a report on the Project, or (ii) does not make a presentation of the same before the internal committee as per schedule, or (ii) secures less than 40% marks in this course.

10.7 **Open Elective Course:** The students have to choose three Open Electives (OE-I, II & III) from the list of Open Electives given by other departments. However, the student can opt for an Open Elective subject offered by his own (parent) department, if the student has not registered and not studied that subject under any category (Professional Core, Professional Electives, Mandatory Courses etc.) offered by parent department in any semester. Open Elective subjects already studied should not repeat/should not match with any category (Professional Core, Professional Electives, Mandatory Courses etc.) of subjects even in the forthcoming semesters.

10.8 **Professional Electives:** The students have to choose Five Professional Electives (PE-I to V/VI) from the list of professional electives given.

10.9 There shall be Industry training (or) Internship (or) Industry oriented Mini-project (or) Skill Development Courses (or) Paper presentation in reputed journal (or) Industry Oriented Mini Project in collaboration with an industry of their specialization. Students shall register for this immediately after II-Year II Semester Examinations and pursue it during summer vacation/semester break & during III Year without effecting regular course work. Internship at reputed organization (or) Skill development courses (or) Paper presentation in reputed journal (or) Industry Oriented Mini Project shall be submitted in a report form and presented before the committee in III-year II semester before end semester examination. It shall be evaluated for 100 external marks. The committee consists of an External Examiner, Head of the Department, Supervisor of the Industry Oriented Mini Project (or) Internship etc, Internal Supervisor and a Senior Faculty Member of the Department. There shall be NO internal marks for Industry Training (or) Internship (or) Mini-Project (or) Skill Development Courses (or) Paper Presentation in reputed journal (or) Industry Oriented Mini Project.

10.10

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

b) For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall evaluate the project work and project supervisor shall evaluate for 100 marks. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) secures less than 40% marks in the total of the CIE.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

c) For Project Stage – II, the external examiner shall evaluate the project work for 60 marks and the project supervisor shall evaluate it for 40 marks. The topics for industrial oriented mini project and Project Stage – I shall be different from one another. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the external examiner as per schedule, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together.

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

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if student fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

10.11 Semester End Examination:

a) Question paper contains 2 Parts (Part-A and Part-B) having the questions distributed equally among all units.

b) The distribution of marks for i) PART-A for 10 marks ii) PART-B for 50 marks. Pattern of the question paper is as follows:

PART–A

Consists of one question which is compulsory. The question consists of ten sub-questions two from each unit and carries1 mark each.

PART-B

Consists of 5 questions carrying 10 marks each. Each of these questions is from one unit and may contain sub questions. Each question there will be an "either" "or" choice (that means there will be two questions from each unit and the student should answer any one question).

10.12 For Mandatory Non-Credit Courses offered in a Semester, The internal evaluation is for 100 marks and it shall take place during I Mid-Term examination and II Mid-Term examination. The average marks of two Mid-Term examinations are the final for 100 marks and has secured not less than 40% marks in the CIE, then the student is **PASS** and will be qualified for the award of the degree. No marks or Letter Grade shall be allotted for these courses/activities. However, for non-credit courses '**Satisfactory'** or "**Unsatisfactory'** shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

10.13 A student shall be given only one time chance to re-register for a maximum of two Subjects in a semester:

- If the internal marks secured by a student in the Continuous Internal Evaluation marks for 40 (Sum of average of two mid-term examinations consisting of Objective & descriptive parts, Average of two Assignments & Subject Vivavoce/PPT/ Poster presentation/ Case Study on a topic in the concerned subject) are less than 35% and failed in those subjects.

- A student must re-register for the failed subject(s) for 40 marks within four weeks of commencement of the classwork in next academic year. Also, the student has to earn 35% of total internal marks (14 out of 40 marks including Mid-Term examinations, Assignment& Subject Viva-voce/PPT/ Poster presentation/ Case Study on a topic in the concerned subject).
- In the event of the student taking this chance, his Continuous Internal Evaluation marks for 40 and Semester End Examination marks for 60 obtained in the previous attempt stand cancelled.

10.14 SWAYAM: College intends to encourage the students to do a minimum of one MOOC in discipline and open elective during third year. The respective departments shall give a list of **s**tandard MOOCs providers including SWAYAM whose credentials are endorsed by the BoS. In general, MOOCs providers provide the result in percentage. In such case, specified by the college shall follow the grade table mentioned in 12.2. The Credits for MOOC(s) shall be transferred same as given for the respective discipline or open electives. In case a student fails to complete the MOOCs he/she shall re-register for the same with any of the providers from the list provided by the department. The equivalence of the courses shall be established by the department committee. Still if a student fails to clear the course/s, or in case a provider fails to offer a MOOC in any semester, then in all such cases the college shall conduct the end semester examinations for the same as per the college end semester examination pattern. The syllabi for the supplementary examinations shall be same as that of MOOCs. There shall be no internal assessment however the marks obtained out of 70 shall be scaled up to 100 marks and the respective letter grade shall be allotted. The details of MOOC(s) shall be displayed in Memorandum of Grades of a student, provided he/she submits the proof of completion of it or them to the examination branch through the Coordinator/Mentor, before the end semester examination of the particular semester.

11 AWARD OF DEGREE

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

11.2 A student who qualifies for the award of the degree as listed in item 12.1 shall be placed in the following classes.

11.3 A student with final CGPA (at the end of the undergraduate programme) > 8.00, and fulfilling the following conditions - shall be placed in **'First Class with Distinction'**. However, he

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

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

A student not fulfilling any of the above conditions with final CGPA > 8 shall be placed in **'First Class'**.

11.4 Students with final CGPA (at the end of the undergraduate programme) ≥ 7.0 but < 8.00 shall be placed in **'First Class'**.

11.5 Students with final CGPA (at the end of the undergraduate programme) ≥ 6.00 but < 7.00, shall be placed in **'Second Class'**.

11.6 All other students who qualify for the award of the degree (as per item 12.1), with final CGPA (at the end of the undergraduate programme) ≥ 5.00 but < 6, shall be placed in **'pass class'**.

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

12 LETTER GRADE AND GRADE POINT

12.1 Marks will be awarded to indicate the performance of each student in each Theory Subject, or Lab/Practical's, or Seminar, or Project, or Internship*/Mini-Project, Minor Course etc., based on the %marks obtained in CIE+SEE (Continuous Internal Evaluation + Semester End Examination, both taken together), and a corresponding Letter Grade shall be given.

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

% of Marks Secured (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
90% and above (≥ 90% , ≤ 100%)	O (Outstanding)	10
Below 90% but not less than 80% (≥ 80% , < 90%)	A^+ (Excellent)	9
Below 80% but not less than 70% (≥ 70% , < 80%)	A (Very Good)	8
Below 70% but not less than 60% (≥ 60% , < 70%)	B^+ (Good)	7
Below 60% but not less than 50% (≥ 50% , < 60%)	B (Average)	6
Below 50% but not less than 40% (≥ 40% , < 50%)	C (Pass)	5
Below 40% (< 40%)	F (FAIL)	0
Absent	AB	0

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

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

12.5 In general, a student shall not be permitted to repeat any Subject/Course (s) only for the sake of 'Grade Improvement' or 'SGPA/CGPA Improvement'. However, he has to repeat all the Subjects/Courses pertaining to that Semester, when he is detained.

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

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

12.7 The Student passes the Subject/Course only when he gets GP ≥ 4 (P Grade or above).

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

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

where 'i' is the Subject indicator index (takes into account all Subjects in a Semester), 'N' is the no. of Subjects 'REGISTERED' for the Semester (as specifically required and listed under the Course Structure of the parent Department), C_i is the no. of Credits allotted to that ix Subject, and G_i represents the Grade Points (GP) corresponding to the Letter Grade awarded for that i Subject.

Illustration of Computation of SGPA Computation

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit x Grade)
Course1	3	A	8	3 x 8 = 24
Course2	4	B+	7	4 x 7 = 28
Course3	3	B	6	3 x 6 = 18
Course4	3	O	10	3 x10= 30
Course5	3	C	5	3 x 5 = 15
Course6	4	B	6	4 x 6 = 24

Thus, SGPA =139/20 =6.95

12.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over all Semesters considered for registration. The CGPA is the ratio of the Total Credit Points secured by a student in ALL registered Courses in ALL Semesters, and the Total Number of Credits registered in ALL the Semesters. CGPA is rounded off to TWO Decimal Places. CGPA is thus computed from the I Year Second Semester onwards, at the end of each Semester, as per the formula

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

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

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

For CGPA Computation

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8
Credits : 19.5 SGPA : 6.9	Credits : 20.5 SGPA : 7.8	Credits : 18.0 SGPA : 5.6	Credits : 19.0 SGPA : 6.0	Credits : 21.5 SGPA : 6.3	Credits : 21.5 SGPA : 8.0	Credits : 23 SGPA : 8.0	Credits : 17 SGPA : 8.0

Thus, **CGPA =** $\frac{19.5\text{x}6.9+20.5\text{x}7.8+18.0\text{x}5.6+19.0\text{x}6.0+21.5\text{x}6.3+21.5\text{x}8.0+23\text{x}8.0+17\text{x}8.0}{160} = 7.10$

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

12.11 For Calculations listed in Item 12.5–12.10, performance in failed Subjects/Courses (securing F Grade) will also be taken into account, and the Credits of such Subjects/Courses will also be included in the multiplications and summations. However, Mandatory Courses will not be taken into consideration.

12.12 Conversion formula for the conversion of GPA into indicative percentage is

% of marks scored = (final CGPA -0.50) x 10

13 AWARD OF 2-YEAR B.TECH. DIPLOMA CERTIFICATE

13.1 A student is awarded 2-Year UG Diploma Certificate in the concerned engineering Branch on completion of all the academic requirements and earned all the 80 credits (within 4 years from the date of admission) up to B.Tech. II Year II Semester, if the student wants to exit the 4-Year B.Tech. Program and requests for the 2 -Year B.Tech. (UG) Diploma Certificate.

13.2 The student **once opted and awarded 2-Year UG Diploma Certificate, the Student will be permitted to join** in B. Tech. III Year I Semester and continue for completion of remaining years of study for 4-Year B. Tech. Degree ONLY in the next academic year along with next batch students. However, if any student wishes to continue the study after opting for exit, he/she should register for the subjects/courses in III Year I Semester before commencement of class work for that semester.

13.3 The students, who exit the 4-Year B. Tech. program after II Year of study and wish to re-join the B.Tech. Program, must submit the 2 -Year B. Tech. (UG) Diploma Certificate awarded to him, subject to the eligibility for completion of Course/Degree.

13.4 A student may be permitted to take one year break after completion of II Year II Semester or B. Tech. III Year II Semester (with university permission through the principal of the college well in advance) and can re-enter the course in **next Academic Year in the same college** and complete the course on fulfilling all the academic credentials within a stipulated duration i.e. double the duration of the course (Ex. within 8 Years for 4-Year program).

14. DECLARATION OF RESULTS

Computation of SGPA and CGPA are done using the procedure listed in 12.5 – 12.10. No SGPA/CGPA is declared, if a candidate is failed in any one of the courses of a given Semester.

15. WITH HOLDING OF RESULTS

If the student has not paid fees to College at any stage, or has pending dues against his name due to any reason what so ever, or if any case of indiscipline is pending against him, the result of such student may be withheld, and he will not be allowed to go into the next higher Semester. The Award or issue of the Degree may also be withheld in such cases.

16. REVALUATION

Students shall be permitted for revaluation after the declaration of end Semester examination results within due dates by paying prescribed fee. After revaluation if there is any betterment in the grade, then improved grade will be considered. Otherwise old grade shall be retained.

17. SUPPLEMENTARY EXAMINATIONS

Supplementary examinations for the odd Semester shall be conducted with the regular examinations of even Semester and vice versa, for those who appeared and failed or absent in regular examinations. Such candidates writing supplementary examinations may have to write sometimes one or two examinations per day.

ADVANCED SUPPLEMENTARY EXAMINATION

Advanced supplementary examinations will be conducted for IV year II Semester after announcement of regular results.

18. TRANSCRIPTS

After successful completion of prerequisite credits for the award of degree a Transcript containing performance of all academic years will be issued as a final record. Duplicate PC, CMM & Transcripts will also be issued if required after the payment of requisite fee and also as per norms in vogue.

19. RULES OF DISCIPLINE

19.1 Any attempt by any student to influence the teachers, Examiners, faculty and staff of controller of Examination for undue favors in the exams, and bribing them either for marks or attendance will be treated as malpractice cases and the student can be debarred from the college.

19.2 When the student absents himself, he is treated as to have appeared and obtained zero marks in that course(s) and grading is done accordingly.

19.3 When the performance of the student in any subject(s) is cancelled as a punishment for indiscipline, he is awarded zero marks in that subject(s).

19.4 When the student's answer book is confiscated for any kind of attempted or suspected malpractice the decision of the Examiner is final.

20. MALPRACTICE PREVENTION COMMITTEE

A malpractice prevention committee shall be constituted to examine and punish the students who involve in malpractice / indiscipline in examinations. The committee shall consist of:

a) Controller of examinations - Chairman
b) Addl. Controller of examinations.- Member Convener
c) Subject expert - member
d) Head of the department of which the student belongs to. - Member
e) The invigilator concerned - member

The committee shall conduct the meeting after taking explanation of the student and punishment will be awarded by following the malpractice rules meticulously.

Any action on the part of candidate at the examination like trying to get undue advantage in the performance at examinations or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder. The involvement of the Staff who are in charge of conducting examinations, valuing examination papers and preparing / keeping records of documents relating to the examinations, in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examination shall be viewed seriously and will be recommended for appropriate punishment after thorough enquiry.

21. TRANSITORY REGULATIONS

A. For students detained due to shortage of attendance:

1. A Student who has been detained in I year of R18/R21 Regulations due to lack of attendance, shall be permitted to join I year I Semester of R22 Regulations and he is required to complete the study of B.Tech. programme within the stipulated period of eight academic years from the date of first admission in I Year.
2. A student who has been detained in any semester of II, III and IV years of R18/R21 regulations for want of attendance, shall be permitted to join the corresponding semester of R22 Regulations and is required to complete the study of B.Tech.within the stipulated period of eight academic years from the date of first admission in I Year. The R22 Academic Regulations under which a student has been readmitted shall be applicable to that student from that semester. See rule (C) for further Transitory Regulations.

B. For students detained due to shortage of credits:

3. A student of R18/R21 Regulations who has been detained due to lack of credits, shall be promoted to the next semester of R22 Regulations only after acquiring the required number of credits as per the corresponding regulations of his/her first admission. The total credits required are 160 including both R18/R21 & R22 regulations. 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. The R22 Academic Regulations are applicable to a student from the year of readmission. See rule (C) for further Transitory Regulations.

C. For readmitted students in R22 Regulations:

4. A student who has failed in any subject under any regulation has to pass those subjects in the same regulations.
5. The maximum credits that a student acquires for the award of degree, shall be the sum of the total number of credits secured in all the regulations of his/her study including R22 Regulations. **There is NO exemption of credits in any case.**
6. If a student is readmitted to R22 Regulations and has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in R22 Regulations will be substituted by another subject to be suggested by the University.

   Note: If a student readmitted to R22 Regulations and has not studied any subjects/topics in his/her earlier regulations of study which is prerequisite for further subjects in R22 Regulations, the College Principals concerned shall conduct remedial classes to cover those subjects/topics for the benefit of the students.

22. STUDENT TRANSFERS

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

22.2 There shall be no transfers from one college/stream to another within the constituent colleges and units of Jawaharlal Nehru Technological University Hyderabad.

22.3 The students seeking transfer to colleges affiliated to JNTUH from various other Universities/institutions have to pass the failed subjects which are equivalent to the subjects of HITS, and also pass the subjects of HITS which the students have not studied at the earlier institution. Further, though the students have passed some of the subjects at the earlier institutions, if the same subjects are prescribed in different semesters of HITS, the students have to study those subjects in HITS in spite of the fact that those subjects are repeated.

22.4 The transferred students from other Universities/Institutions to JNTUH affiliated colleges who are on rolls are to be provided one chance to write the CBT (for internal marks) in the **equivalent subject(s)** as per the clearance letter issued by the University.

22.5 The college has to provide one chance to write the internal examinations in the **equivalent subject(s)** to the students transferred from other universities/institutions to HITS who are on rolls, as per the clearance (equivalence) letter issued by the University.

23. AMENDMENTS TO REGULATIONS

The Academic Council of Holy Mary Institute of Technology & Science reserves the right to revise, amend, or change the regulations, scheme of examinations, and / or syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

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

Transfer of student is permitted subjected to the rules and regulations of TSCHE (TE Department) and JNTUH in vogue.

The College shall have its own Annual Graduation Day for the award of Degrees issued by the College/University.

Institute will award Medals to the outstanding students who complete the entire course in the first attempt within the stipulated time.

i) Where the words “he”, “him”, “his”, occur in the write-up of regulations, they include “she”, “her”.
ii) Where the words “Subject” or “Subjects”, occur in these regulations, they also imply “Course” or “Courses”.
iii) The Academic Regulations should be read as a whole, for the purpose of any interpretation.
iv) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman of the Academic Council is final.

Academic Regulations for B. Tech. (Lateral Entry Scheme) (Effective for the students getting admitted into II year from the Academic Year 2023-2024 on wards)

1. ELIGIBILITY FOR THE AWARD OF B.TECH DEGREE (LES)

i. 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.

ii. The Students have to acquire 120 credits from II to IV year of B.Tech Programme (Regular) for the award of the degree.

iii. Students, who fail to fulfill the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.

iv. The same attendance regulations are to be adopted as that of B. Tech. (Regular)

2. PROMOTION RULE:

A Student will not be promoted from II Year to III Year, unless he/she fulfills the Attendance and Academic Requirements and (i) secure a Total of 60% Credits up to III Year II Semester, from all the regular and supplementary examinations.

A Student will not be promoted from III Year to IV Year, unless he/she fulfills the Attendance and Academic Requirements and (i) secure a Total of 60% Credits up to III Year II Semester, from all the regular and supplementary examinations.

3. AWARD OF DEGREE:

After the student has satisfied the requirements prescribed for the completion of the programme and is eligible for the award of B. Tech. Degree, he/she shall be placed in one of the following four classes: The marks obtained for 120 credits will be considered for the calculation of CGPA.

All other regulations as applicable for B. Tech. Four-year degree programme (Regular) will hold good for B.Tech (Lateral Entry Scheme).

Malpractices Rules - Disciplinary Action For /Improper Conduct in Examinations

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

4	Smuggles 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 subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred for two consecutive Semesters from class work and all 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 subject.
6	Refuses to obey the orders of the Addl. Controller of examinations / 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 addl. Controller of examinations 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 addl. Controller of examinations, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred for two consecutive Semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that Semester/year examinations.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the principal for further action to award suitable punishment.	

COURSE STRUCTURE

B.Tech – Electrical & Electronics Engineering

I B.Tech.- I-Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A2MA101BS	Linear Algebra and Calculus	BSC	3	1	0	4	40	60	100
A2CH102BS	Engineering Chemistry	BSC	3	1	0	4	40	60	100
A2CS106ES	Programming for Problem Solving	ESC	3	0	0	3	40	60	100
A2EE108ES	Electrical Circuit Analysis-1	ESC	3	0	0	3	40	60	100
A2ME108ES	Engineering Graphics	ESC	1	0	4	3	40	60	100
A2EE109ES	Elements of Electrical and Electronics Engineering	ESC	0	0	2	1	50	-	50
A2CH110BS	Engineering Chemistry Lab	BSC	0	0	2	1	40	60	100
A2CS114ES	Programming for Problem Solving Lab	ESC	0	0	2	1	40	60	100
Total			**13**	**2**	**10**	**20**	**330**	**420**	**750**
Mandatory Course (Non-Credit)									
A2EE101MC	Technical Seminar-I / Social Innovation	MC	-	-	2	-	100	-	100

I B.Tech.- II-Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A2MA201BS	Ordinary Differential Equations and Advanced Calculus	BSC	3	1	0	4	40	60	100
A2AP204BS	Applied Physics	BSC	3	1	0	4	40	60	100
A2ME216ES	Workshop Manufacturing Practice	ESC	0	1	3	2.5	40	60	100
A2EN205HS	English for Skill Enhancement	HSMC	2	0	0	2	40	60	100
A2EE210ES	Electrical circuit Analysis-II	ESC	2	0	0	2	40	60	100
A2AP212BS	Applied Physics Lab	BSC	0	0	3	1.5	40	60	100
A2EN213HS	English Language Communication Skills Lab	HSMC	0	0	2	1	40	60	100
A2CS202ES	Applied Python Programming Laboratory	ESC	0	1	2	2	40	60	100
A2EE216ES	Electrical circuit Analysis Lab	ESC	0	0	2	1	40	60	100
Total			**10**	**4**	**12**	**20**	**360**	**540**	**900**
Mandatory Course (Non-Credit)									
A2EE202MC	Technical Seminar-II / Engineering Exploration	MC	-	-	2	-	100	-	100

II B.Tech.- I-Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A2MA301BS	Numerical methods and complex variables	BSC	3	1	0	4	40	60	100
A2EE302PC	Power system -1	PCC	3	0	0	3	40	60	100
A2EC309ES	Analog electronic circuits	ESC	3	0	0	3	40	60	100
A2EE303PC	Electrical machines -1	PCC	3	1	0	4	40	60	100
A2EE304PC	Electro magnetic fields	PCC	3	0	0	3	40	60	100
A2EE305PC	Electrical machines laboratory-1	PCC	0	0	2	1	40	60	100
A2EC310ES	Analog electronic circuits laboratory	ESC	0	0	2	1	40	60	100
A2EE306PC	Electrical simulation tools laboratory	PCC	0	0	2	1	40	60	100
Total			**15**	**2**	**6**	**20**	**320**	**480**	**800**
Mandatory Course (Non-Credit)									
A2EE301MC	Gender Sensitization	MC	0	0	2	0	100	-	100

II B.Tech.- II-Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A2ME401ES	Solid mechanics and hydraulic machines	ESC	3	1	0	4	40	60	100
A2EE401PC	Measurements and instrumentation	PCC	3	0	0	3	40	60	100
A2EE402PC	Electrical Machines II	PCC	3	0	0	3	40	60	100
A2EC408ES	Digital Electronics	ESC	2	0	0	2	40	60	100
A2EE403PC	Power systems II	PCC	3	0	0	3	40	60	100
A2EC409ES	Digital electronics laboratory	ESC	0	0	2	1	40	60	100
A2EE404PC	Measurement and Instrumentation laboratory	PCC	0	0	2	1	40	60	100
A2EE405PC	Electrical Machines Laboratory-II	PCC	0	0	2	1	40	60	100
A2EE406PW	Real-Time Research project/field based project	PWC	0	0	4	2	50	-	50
Total			**14**	**1**	**10**	**20**	**370**	**480**	**850**
Mandatory Course (Non-Credit)									
A2EE402MC	Environmental science	MC	3	-	-	-	100	-	100

III B.Tech.- I-Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A2EE501PC	Power Electronics	PCC	3	1	0	4	40	60	100
A2EE502PC	Control systems	PCC	3	1	0	4	40	60	100
A2EC502ES	Microprocessors and Microcontrollers	ESC	3	0	0	3	40	60	100
	Professional Elective –I	PEC	3	0	0	3	40	60	100
A2MB503HS	Business Economics & Financial Analysis	HSMC	3	0	0	3	40	60	100
A2EC506ES	Microprocessors and Microcontrollers Lab	ESC	0	0	2	1	40	60	100
A2EE503PC	Power Electronics Lab	PCC	0	0	2	1	40	60	100
A2EE505HS	Advanced English Communication Skills lab	HSMC	0	0	2	1	40	60	100
Total			**15**	**2**	**6**	**20**	**320**	**480**	**800**
Mandatory Course (Non-Credit)									
A2EE503MC	Intellectual property rights	MC	2	-	-	-	100	-	100

III B.Tech.- II-Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
	Open Elective I	PCC	3	0	0	3	40	60	100
	Professional Elective II	PCC	3	0	0	3	40	60	100
A2EC601ES	Digital signal processing	ESC	3	0	0	3	40	60	100
A2EE601PC	Power system protection	PCC	3	0	0	3	40	60	100
A2EE602PC	Power system operation and control	PCC	3	0	0	3	40	60	100
A2EE603PC	Power system laboratory	PCC	0	0	2	1	40	60	100
A2EE604PC	Control system laboratory	PCC	0	0	2	1	40	60	100
A2EC603ES	Digital signal processing lab	ESC	0	0	2	1	40	60	100
A2EC604PW	Industry oriented Mini Project/Internship	PWC	0	0	4	2	-	100	100
Total			**15**	**0**	**10**	**20**	**320**	**580**	**900**
Mandatory Course (Non-Credit)									
A2EE604MC	Constitution of India	MC	2	-	-	-	100	-	100

IV B.Tech.- I-Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A2EE720PC	Power electronic applications to renewable energy systems	PCC	3	1	0	4	40	60	100
	Open Elective – II	OEC	3	0	0	3	40	60	100
	Professional Elective – III	PEC	3	0	0	3	40	60	100
	Professional Elective – IV	PEC	3	0	0	3	40	60	100
A2MB721HS	Fundamentals of management for engineers	HSMC	2	0	0	2	40	60	100
A2EE722PC	Simulation of renewable energy systems laboratory	PCC	0	0	4	2	40	60	100
A2EE703PW	Project stage-I	PWC	0	0	6	3	100	-	100
Total			**14**	**1**	**10**	**20**	**340**	**360**	**700**

IV B.Tech.- II-Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
	Open Elective-III	PCC	3	0	0	3	40	60	100
	Professional Elective -V	PEC	3	0	0	3	40	60	100
	Professional Elective -VI	PEC	3	0	0	3	40	60	100
A2EE803PW	Project Stage –II including seminar	PWC	0	0	22	9+2	40	60	100
Total			**9**	**0**	**22**	**20**	**160**	**240**	**400**

Total Credits – 160

PROFESSIONAL ELECTIVES			
PE-I		**PE-II**	
A2EE501PE	IOT Applications in Electrical Engineering	A2EE604PE	Cyber-Physical systems
A2EE502PE	High Voltage Engineering	A2EE605PE	Power semiconductor drives
A2EE503PE	Computer Aided Electrical Machine Design	A2EE606PE	Wind and Solar Energy Systems
PE-III		**PE-IV**	
A2EE707PE	Mobile Application development	A2EE710PE	HVDC Transmission
A2EE708PE	Signals and Systems	A2EE711PE	Power system Reliability
A2EE709PE	Electric and hybrid vehicles	A2EE712PE	Embedded applications
PE-V		**PE-VI**	
A2EE813PE	Power Quality & FACTS	A2EE816PE	Smart grid technologies
A2EE814PE	Solar Power Batteries	A2EE817PE	Electrical Distrubution Systems
A2EE815PE	AI Techniques in Electrical Engineering	A2EE818PE	Machine learning Applications to Electrical Engineering

OPEN ELECTIVES			
OE-I		**OE-II**	
A2EE601OE	Renewable Energy Sources	A2EE703OE	Utilization of Electric Energy
A2EE602OE	Fundamental of Electric Vehicles	A2EE704OE	Energy Storage Systems
OE-III			
A2EE805OE	Charging Infrastructure for Electric Vehicles		
A2EE806OE	Reliability Engineering		

MANDATORY COURSE (Non-Credit)			
A2EE301MC	Gender Sensitization	A2EE503MC	Intellectual property rights
A2EE402MC	Environmental science	A2EE604MC	Constitution of India

I-YEAR (I-SEMESTER)

LINEAR ALGEBRA AND CALCULUS

I B.TECH I SEM **L T P C**

Course Code: A2MA101BS **3 1 0 4**

COURSE OBJECTIVES

To learn

1. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
2. Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
3. Evaluation of improper integrals using Beta and Gamma functions.
4. Partial differentiation and finding maxima and minima of function of two and three variables.
5. Evaluation of multiple integrals and their applications.

COURSE OUTCOMES

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

1. Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
2. Find the Eigen values and Eigen vectors and reduce the quadratic form to canonical form using orthogonal transformations.
3. Solve the applications on the mean value theorems and evaluate the improper integrals using Beta and Gamma functions
4. Find the extreme values of functions of two variables with/ without constraints.
5. Evaluate the multiple integrals and apply the concept to find areas, volumes

UNIT I MATRICES

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; Orthogonal matrices; Unitary Matrices; Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; Solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method; Gauss Seidel Iteration Method.

UNIT II EIGEN VALUES AND EIGEN VECTORS

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

UNIT III CALCULUS

Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series . Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT IV MULTIVARIABLE CALCULUS

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

UNIT V MULTIVARIABLE INTEGRAL CALCULUS

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

Applications: Areas (by double integrals) and Volumes (by double integrals and triple integrals).

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

REFERENCE BOOKS

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

ENGINEERING CHEMISTRY

I B. TECH I SEM **L T P C**
Course Code: A2CH102BS **3 1 0 4**

COURSE OBJECTIVES:

1. To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
2. To include the importance of water in industrial usage, fundamental aspects of battery chemistry, significance of corrosion it's control to protect the structures.
3. To imbibe the basic concepts of petroleum and its products.
4. To acquire required knowledge about engineering materials like cement, smart materials and Lubricants.

COURSE OUTCOMES:

1. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can learn the fundamentals and general properties of polymers and other engineering materials.
4. They can predict potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs. .

UNIT I WATER AND ITS TREATMENT

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break - point chlorination. Defluoridation- Determination of F- ion by ion- selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods Softening of water by ion- exchange processes. Desalination of water – Reverse osmosis.

UNIT II BATTERY CHEMISTRY & CORROSION

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

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

UNIT III POLYMERIC MATERIALS

Definition – Classification of polymers with examples – Types of polymerization –addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene

Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, Preparation,Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP).

Rubbers: Natural rubber and its vulcanization.

Elastomers: Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.

Conducting polymers: Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.

Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT IV ENERGY SOURCES

Introduction, Calorific value of fuel – HCV, LCV- Dulongs formula. Classification- solid fuels: coal –analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Transesterification, advantages.

UNIT V ENGINEERING MATERIALS

Cement: Portland cement, its composition, setting and hardening.

Smart materials and their engineering applications

Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinyl amides

Lubricants: Classification of lubricants with examples-characteristics of good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010 .
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning,2016 .
3. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K Shashikala, Pearson Publications, 2021.
4. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.
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REFERENCE BOOKS:

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015) .
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011) .

PROGRAMMING FOR PROBLEM SOLVING

I B.Tech-I Semester **L T P C**
Course Code: A2CS106ES **3 0 0 3**

COURSE OBJECTIVES:

To learn the fundamentals of computers.
1. To understand the various steps in program development.
2. To learn the syntax and semantics of the C programming language.
3. To learn the usage of structured programming approaches in solving problems.

COURSE OUTCOMES:

The student will learn
1. To write algorithms and to draw flowcharts for solving problems
2. To convert the algorithms/flowcharts to C programs.
3. To code and test a given logic in the C programming language.
4. To decompose a problem into functions and to develop modular reusable code.
5. To use arrays, pointers, strings and structures to write C programs
6. Searching and sorting problems.

UNIT I

Introduction to Programming Compilers, compiling and executing a program. Representation of Algorithm - Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number Flowchart/Pseudo code with examples, Program design and structured programming Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do- while loops I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr. Command line arguments

UNIT II

Arrays, Strings, Structures and Pointers: Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings Structures: Defining structures, initializing structures, unions, Array of structures Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in selfreferential structures, usage of self referential structures in linked list (no implementation) Enumeration data type

UNIT III

Preprocessor and File handling in C: Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef Files: Text and Binary files, Creating and Reading and writing text and binary files, appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

UNIT IV

Function and Dynamic Memory Allocation: Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries R22 B.Tech. AI & DS Syllabus JNTU Hyderabad Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

UNIT V

Searching and Sorting: Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs

TEXT BOOKS

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCE BOOKS

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

ELECTRICAL CIRCUIT ANALYSIS –I

I B. TECH I SEM **L T P C**
Course Code: A2EE108ES **3 0 0 3**

Prerequisites: Mathematics

COURSE OBJECTIVES:
1. To gain knowledge in circuits and to understand the fundamentals of derived circuit laws.
2. To learn steady state and transient analysis of single phase and 3-phase circuits.
3. To understand Theorems and concepts of coupled circuits.

COURSE OUTCOMES:
After learning the contents of this paper the student must be able to
1. Understand network analysis, techniques using mesh and node analysis.
2. Evaluate steady state and transient behavior of circuits for DC and AC excitations.
3. Analyze electric circuits using network theorems and concepts of coupled circuits.

UNIT I NETWORK ELEMENTS & LAWS
Active elements, Independent and dependent sources. Passive elements — R, L and C, Energy stored in inductance and capacitance, Kirchhoff's laws, Source transformations, Star-delta transformations, Node voltage method, Mesh current method including super node and supermesh analysis.

UNIT II SINGLE-PHASE CIRCUITS
RMS and average values of periodic sinusoidal and non- sinusoidal waveforms, Phasor representation, Steady-state response of series, parallel and series-parallel circuits. Impedance, Admittance, Current locus diagrams of RL and RC series and parallel circuits with variation of various parameters. Resonance: Series and parallel circuits, Bandwidth and Q-factor.

UNIT III NETWORK THEOREMS
Superposition theorem, Thevinin's theorem, Norton's theorems, Maximum power transfer theorem, Tellegen's theorem, Compensation theorem, Milliman's theorem and Reciprocitytheorem. (AC & DC).

UNIT IV POLY-PHASE CIRCUITS
Analysis of balanced and unbalanced 3-phase circuits, Star and delta connections, Measurement of three-phase power for balanced and unbalanced loads.

UNIT V COUPLED CIRCUITS
Concept of self and mutual inductance, Dot convention, Coefficientof coupling, Analysis of circuits with mutual inductance.

Topological Description of Networks: Graph, tree, chord, cut-set, incident matrix, circuit matrix andcut-set matrix,

TEXTBOOKS:
1. Van Valkenburg M.E, "Network Analysis", Prentice Hall of India, 3rd Edition, 2000.
2. Ravish R Singh, "Network Analysis and Synthesis", McGrawHill, 2nd Edition, 2019.

REFERENCE BOOKS:
1. B. Subramanyam, "Electric Circuit Analysis", Dreamtech Press & Wiley, 2021.
2. James W.Nilsson, Susan A.Riedel, "Electric Circuits", Pearson, 11th Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, "Circuits and Networks: Analysis and Synthesis", McGraw Hill, 5th Edition, 2017.
4. Jagan N.C, Lakshrninarayana C., "Network Analysis", B.S. Publications, 3rd Edition, 2014.
5. William Hayt H, Kimmerly Jack E. and Steven Durbin M, "Engineering Circuit Analysis", McGraw Hill, 6th Edition, 2002.
6. Chakravarthy A., "Circuit Theory", Dhanpat Rai & Co., First Edition, 1999.

ENGINEERING GRAPHICS

I-B.TECH I-SEMESTER
Course Code: A2ME108ES

L	T	P	C
1	0	4	3

COURSE OBJECTIVES

1. To provide basic concepts in engineering drawing.
2. To impart knowledge about standard principles of orthographic projection of objects.
3. To draw sectional views and pictorial views of solids.

COURSE OUTCOMES

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

1. Preparing working drawings to communicate the ideas and information.
2. Read, understand and interpret engineering drawings.

UNIT-I INTRODUCTION

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 & Diagonal, Introduction to Computer aided drafting – views, commands and conics

UNIT -II PROJECTIONS

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

UNIT -III PROJECTION OF SOLIDS

Projection of Solids and Sectioned Solids:Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere, Computer aided projections of solids – sectional views.

UNIT -IV DEVELOPMENT OF LATERAL SURFACES

Development of Lateral Surfaces: Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

UNIT-V ISOMETRIC PROJECTIONS

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views –Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non-isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions, Conversion of orthographic projection into isometric view using computer aided drafting.

TEXT BOOKS

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford

REFERENCE BOOKS

1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGraw Hill
2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

Note: - External examination is conducted in conventional mode and internal evaluation to be done by both conventional as well as using computer aided drafting.

ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING

I B. TECH I SEM **L T P C**
Course Code: A2EE109ES **0 0 2 1**

Prerequisites: Elements of Electrical Engineering

COURSE OBJECTIVES:

1. To measure the electrical parameters for different types of DC and AC circuits using conventional and theorems approach.
2. To study the transient response of various R, L and C circuits using different excitations.
3. To determine the performance of different types of DC machines and Transformers.

COURSE OUTCOMES:

After learning the contents of this paper the student must be able to

1. Verify the basic Electrical circuits through different experiments.
2. Evaluate the performance calculations of Electrical Machines and Transformers through various testing methods.
3. Analyze the transient responses of R, L and C circuits for different input conditions.

LIST OF EXPERIMENTS/DEMONSTRATIONS:

PART-A (compulsory)

1. Verification Ohm's Law
2. Verification of KVL and KCL
3. Vrification of Thevenin's and Norton's theorem.
4. Verification of Superposition theorem
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of aSingle-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Open Circuit and Short Circuit Tests on 1-phase Transformer

PART-B (any two experiments from the given list)

1. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
2. Verification of Reciprocity and Milliman's Theorem.
3. Verification of Maximum Power Transfer Theorem.
4. Determination of form factor for non-sinusoidal waveform
5. Transient Response of Series RL and RC circuits for DC excitation

TEXTBOOKS:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition,2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition,2008.

REFERENCE BOOKS:

1. P.Ramana, M.Suryakalavathi, G.T.Chandrasheker,"Basic Electrical Engineering", S.Chand, 2ndEdition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M.S.Sukhija, T.K.Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition,2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic ElectricalEngineering", 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

ENGINEERING CHEMISTRY LAB

I B. TECH I SEM **L T P C**
Course Code: A2CH110BS **0 0 2 1**

COURSE OBJECTIVES:

The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Students are able to perform estimations of acids and bases using conductometry, potentiometry.
2. Students will learn to prepare polymers such as Bakelite and Thiokol Rubber in the laboratory.
3. Students will learn skills related to the lubricant properties such as saponification value, surface-tension and viscosity of oils.
4. Estimation of hardness of water to check its suitability for drinking purpose.

COURSE OUTCOMES:

The experiments will make the student gain skills on:

1. Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
2. Able to perform methods such as conductometry, potentiometry in order to find out the concentrations or equivalence points of acids and bases.
3. Students are able to prepare polymers like bakelite and Thiokol Rubber.
4. Estimations saponification value, surface tension and viscosity of lubricant oils.

LIST OF EXPERIMENTS:

1.Volumetric Analysis:

1.Estimation of Hardness of water by EDTA Complexometry method.

1I.Conductometry Analysis:

1.Estimation of the concentration of an acid by Conductometry.

III.Potentiometry:

1.Estimation of the amount of Fe+2 by Potentiomentry.

IV.P^H metry:

1.Determination of an acid concentration using pH meter.

V. Preparations:

1. Preparation of Bakelite.
2. Preparation Thiokol Rubber.

VI .Lubricants:

1. Estimation of acid value of given lubricant oil.
2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.

VII .Corrosion:

1. Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.

VIII. Virtual Lab Experiments:

1. Construction of Fuel cell and its working.
2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

REFERENCE BOOKS:

1.Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

PROGRAMMING FOR PROBLEM SOLVING LAB

I B.Tech-I Semester **L T P C**
Course Code: A2CS114ES **0 0 2 1**

Note: The programs may be executed using any available Open Source/ Freely available IDE Some of the Tools available are:

CodeLite: https://codelite.org/ Code:Blocks: http://www.codeblocks.org/
DevCpp:http://www.bloodshed.net/devcpp.htmlEclipse: http://www.eclipse.org
This list is not exhaustive and is NOT in any order of preference]

COURSE OBJECTIVES:

The students will learn the following:

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

COURSE OUTCOMES: The candidate is expected to be able to:

1. Formulate the algorithms for simple problems
2. Translate given algorithms to a working and correct program
3. Correct syntax errors as reported by the compilers
4. Identify and correct logical errors encountered during execution
5. Represent and manipulate data with arrays, strings and structures
6. Use pointers of different types
7. Create, read and write to and from simple text and binary files
8. Modularize the code with functions so that they can be reused

Practice Sessions:

1. Write a simple program that prints the results of all the operators available in C (including pre/post increment, bitwise and/or/not , etc.). Read required operand values from standard input.
2. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values from standard input.

Simple numeric problems

1. Write a program for finding the max and min from the three numbers.
2. Write the program for the simple, compound interest.
3. Write a program that declares Class awarded for a given percentage of marks, where mark
   a. **<40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.**
4. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:

e. 5 x 1 = 5
f. 5 x 2 = 10
g. 5 x 3 = 15
h.Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).

b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
c. Write a program that finds if a given number is a prime number
d. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
e. 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.
f. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
g. Write a C program to find the roots of a Quadratic equation.
h. Write a C program to calculate the following, where x is a fractional value.i. 1-x/2 +x^2/4-x^3/6
j. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x^2+x^3+.....+x^n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Arrays, Pointers and Functions:

a. Write a C program to find the minimum, maximum and average in an array of integers.
b. Write a function to compute mean, variance, Standard Deviation, sorting of n elements in a single dimension array.
c. Write a C program that uses functions to perform the following:
d. Addition of Two Matrices
e. Multiplication of Two Matrices
f. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be the same.
g. Write C programs that use both recursive and non-recursive functions
h. To find the factorial of a given integer.
i. To find the GCD (greatest common divisor) of two given integers.
j. To find x^n
k. Write a program for reading elements using a pointer into an array and display the values usingthe array.
l. Write a program for display values reverse order from an array using a pointer.
m. Write a program through a pointer variable to sum of n elements from an array.

Arrays Files:

a. Write a C program to display the contents of a file to standard output device.
b. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
c. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
d. Write a C program that does the following:
It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function)
Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function)
The program should then read all 10 values and print them back.
e. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

Strings:

a. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
b. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
c. Write a C program that uses functions to perform the following operations:
d. To insert a sub-string into a given main string from a given position.
e. To delete n Characters from a given position in a given string.
f. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
g. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn‘tcontain ch.
h. Write a C program to count the lines, words and characters in a given text.

Miscellaneous:

a. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalidchoice is entered.

b. Write a C program to construct a pyramid of numbers as follows:

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

                                 4 4 4 4    * *
                                            *
```

Sorting and Searching:

a. Write a C program that uses non recursive function to search for a Key value in a given
b. list of integers using linear search method.
c. Write a C program that uses non recursive function to search for a Key value in a given
d. sorted list of integers using binary search method.
e. Write a C program that implements the Bubble sort method to sort a given list of
f. integers in ascending order.
g. Write a C program that sorts the given array of integers using selection sort in descending order
h. Write a C program that sorts the given array of integers using insertion sort in ascending order
i. Write a C program that sorts a given array of names

TEXT BOOKS

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)

REFERENCE BOOKS

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PHI
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, how to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

I-YEAR (II-SEMESTER)

ORDINARY DIFFERENTIAL EQUATIONS & ADVANCED CALCULUS

I B. TECH II SEM **L T P C**
Course Code: A2MA201BS **3 1 0 4**

COURSE OBJECTIVES

The students would be able to learn

1. Methods of solving the differential equations of first order.
2. Different methods of solving the differential equations of higher order.
3. Concept, properties of Laplace transforms and Solving ordinary differential equations using Laplace transforms techniques.
4. The physical quantities involved in engineering field related to vector valued functions.
5. The basic properties of vector valued functions and their applications to line, surface and volume integrals

COURSE OUTCOMES

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

1. Identify whether the given differential equation of first order is exact or not
2. Solve higher differential equation and apply the concept of differential equation to real world problems
3. Use the Laplace Transform techniques for solving ODE's
4. Evaluate the line, surface and volume integrals and converting them from one to another.
5. Apply Green, Gauss, and Stokes theorem to the integrals.

UNIT I FIRST ORDER ORDINARY DIFFERENTIAL EQUATION

Exact, linear and Bernoulli's equations: Orthogonal Trajectories (in Cartesian and polar coordinates) Newton's law of cooling, Law of natural growth and decay.

UNIT II ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax}, sin ax, cos ax, polynomials in x, $e^{ax}(x)$ and $x\ V(x)$; method of Variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation .Application to Electrical circuits.

UNIT III LAPLACE TRANSFORMS

Laplace Transform of standard functions; first shifting theorem,Second shifting theorem:Laplace transforms of functions when they are multiplied and divided by 't'. Laplace transforms of derivatives and integrals of function; Evaluation of integrals by Laplace transforms; Laplace transforms of Specific functions(Unit step function ,Unit impulsive function); Laplace transform of Periodic functions.

Inverse Laplace transform by different methods, Convolution theorem (without Proof), Solving ODEs by Laplace Transform method.

UNIT IV VECTOR DIFFERENTIATION

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

UNIT V VECTOR INTEGRATION

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes theorems (statement &their verification)

TEXT BOOKS

1. 1.B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. 2.Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
3. 3.G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint,

REFERENCE BOOKS

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
3. 3.Advance engineering mathematics by RK Jain & S.R.K.Iyengar 3rd edition Narosa publishing house Delhi

APPLIED PHYSICS

I B. TECH II SEM **L T P C**
Course Code: A2AP204BS **3 1 0 4**

COURSE OBJECTIVES:

The objectives of this course for the student are to:
1. Understand the basic principles of quantum physics and band theory of solids.
2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
4. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
5. Study the characteristics of lasers and optical fibres.

COURSE OUTCOMES:

At the end of the course the student will be able to:
1. Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
2. Identify the role of semiconductor devices in science and engineering Applications.
3. Explore the fundamental properties of dielectric, magnetic materials and energy for their applications.
4. Appreciate the features and applications of Nanomaterials.
5. Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

UNIT I QUANTUM PHYSICS AND SOLIDS

Introduction to quantum physics, Black body radiation, Planck's law, Photo electric effect, Compton effect ,De-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle and its applications, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box. Solids: Free electron theory (Drude & Lorentz, Sommerfeld) - merits and demerits of classical and quantum mechanics - Bloch's theorem -Kronig-Penney model(qualitative) – E-K diagram-origin of energy bands- classification of solids.

UNIT II SEMICONDUCTORS AND DEVICES

Intrinsic and Extrinsic semiconductors – Hall effect - Direct and Indirect band gap semiconductors -construction, principle of operation and Characteristics of P-N Junction diode, Zener diode and Bipolar junction transistor (BJT)– LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.

UNIT III DIELECTRIC, MAGNETIC MATERIALS AND SUPER CONDUCTORS

Dielectric materials: Basic definitions, types of polarizations (qualitative), ferroelectric, piezoelectric and pyroelectric materials, applications.Magnetic materials: Basic definitions, Classification of magnetic materials, domain theory for ferromagnetic materials, Hysteresis- soft and hard magnetic materials, magnetostriction, magneto resistance, applications. Super conductors: Introduction, properties of super conductors, Meissner effect, Type-I and Type-II super conductors, applications.

UNIT IV NANOTECHNOLOGY

Introduction to Nanotechnology, Nanoscale, Types of nano materials, quantum confinement, surface to volume ratio, Synthesis of nanomaterials - Top-down method: Ball milling method, Sol-gel synthesis, physical vapor deposition (PVD), and Bottom-up method: combustion methods, Chemical vapor deposition method (CVD); characterization techniques - XRD, SEM &TEM Applications of nanomaterials.

UNIT V LASERS AND FIBRE OPTICS

Lasers: Introduction to interaction of radiation with matter, Characteristics of LASER, Einstein coefficients, Population inversion, Pumping, Principle and working of Laser, Types of Lasers: Ruby laser, Carbon dioxide (CO_2) laser, He-Ne laser, semiconductor lasers, Applications of laser.

Fibre Optics: Introduction to optical fiber, advantages of optical Fibers, total internal reflection construction of optical fiber, acceptance angle, numerical aperture, classification of optical fibers losses in optical fiber, optical fiber for communication system, applications

TEXT BOOKS:

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy" A Text book of Engineering Physics"- S. Chand Publications, 11th Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication,2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill, 4thEdition,2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2ndEdition,2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1st Edition, 2021.

REFERENCES:

1. Quantum Physics, H.C. Verma, TBS Publication, 2nd Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons,11th Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhya - Nano Materials, New Age International, 1stEdition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
7. Energy Materials, Taylor & Francis Group, 1st Edition, 2022.

WORKSHOP MANUFACTURING PRACTICE

I B. TECH II SEM **L T P C**
Course Code: A2ME216ES **0 1 3 2.5**

Pre-requisites: Practical skill

COURSE OBJECTIVES:

1. To Study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at work place.
5. It explains the construction, function, use and application of different working tools, equipment and machines.
6. To study commonly used carpentry joints.
7. To have practical exposure to various welding and joining processes.
8. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

COURSE OUTCOMES:

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

1. CO 1: Study and practice on machine tools and their operations
2. CO 2: Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.
3. CO 3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. CO 4: Apply basic electrical engineering knowledge for house wiring practice.

TRADES FOR EXERCISES:

At least two exercises from each trade:

I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
V. Welding Practice – (Arc Welding & Gas Welding)
VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech
2. Workshop Manual / Venkat Reddy/ BSP

ENGLISH FOR SKILL ENHANCEMENT

I B. TECH II SEM **L T P C**
Course Code: A2EN205HS **2 0 0 2**

COURSE OBJECTIVES:

This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary,Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Equip students to study engineering subjects more effectively and critically using the theoreticaland practical components of the syllabus.

COURSE OUTCOMES:

Students will be able to:

1. Understand the importance of vocabulary and sentence structures.
2. Choose appropriate vocabulary and sentence structures for their oral and writtencommunication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports invarious contexts.
6. Acquire basic proficiency in reading and writing modules of English.

UNIT I

Chapter entitled '***Toasted English*' by R.K.Narayan** from ***"English: Language, Context andCulture"*** published by Orient Black Swan, Hyderabad.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

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

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

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

UNIT II

Chapter entitled **'Appro JRD' by Sudha Murthy** from ***"English: Language, Context and Culture"published*** by Orient BlackSwan, Hyderabad.

Vocabulary: Words Often Miss pelt - Homophones, Homonyms and Homographs

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

Reading: Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

Writing: Nature and Style of Writing- Defining /Describing People, Objects, Places and Events – Classifying- Providing Examples or Evidence.

UNIT III

Chapter entitled **'Lessons from Online Learning' by F.Haider Alvi, Deborah Hurst et al** from ***"English: Language, Context and Culture"*** published by Orient Black Swan, Hyderabad.

Vocabulary: Words Often Confused - 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 – Intensive Reading and Extensive Reading – Exercises for Practice.

Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

UNIT IV

Chapter entitled **'Art and Literature' by Abdul Kalam** from ***"English: Language, Context and Culture"*** published by Orient BlackSwan, Hyderabad.

Vocabulary: Standard Abbreviations in English
Grammar: Redundancies and Clichés in Oral and Written Communication.
Reading: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice
Writing: Writing Practices- Essay Writing-Writing Introduction and Conclusion -Précis Writing.

UNIT – V

Chapter entitled **'Go, Kiss the World' by Subroto Bagchi** from ***"English: Language, Context and Culture"*** published by Orient BlackSwan, Hyderabad.

Vocabulary: Technical Vocabulary and their Usage
Grammar: Common Errors in English (*Covering all the other aspects of grammar which were not covered in the previous units*)
Reading: Reading Comprehension-Exercises for Practice
Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Note: Listening and Speaking Skills which are given under Unit-6 in AICTE Model Curriculum are coveredin the syllabus of ELCS Lab Course.

- **Note: 1**. As the syllabus of English given in AICTE *Model Curriculum-2018 for B.Tech First Year is* ***Open-ended***, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.

- **Note**: **2**.Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents .They are advised to teach 40 percent of each topic from the syllabus in blended mode.

TEXT BOOK:

1. "English: Language, Context and Culture" by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.

REFERENCE BOOKS:

1. Effective Academic Writing by Liss and Davis (OUP)
2. Richards, Jack C. (2022) Interchange Series. Introduction, 1,2,3. Cambridge University Press
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2nd ed.,). Sage Publications India Pvt. Ltd.
5. (2019). Technical Communication. Wiley India Pvt. Ltd.
6. Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students.Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition.

ELECTRICAL CIRCUIT ANALYSIS – II

I B. TECH II SEM **L T P C**
Course Code: A2EE210ES **2 0 0 2**

Prerequisites: Mathematics

COURSE OBJECTIVES:

1. To study the transient analysis of various R, L and C circuits for different inputs
2. To understand the Fourier series and Laplace transformation.
3. To learn about two-port networks and concept of filters.

COURSE OUTCOMES:

After learning the contents of this paper the student must be able to

1. Observe the response of various R, L and C circuits for different excitations.
2. Examine the behavior of circuits using Fourier, Laplace transforms and transfer function ofsingle port network.
3. Obtain two port network parameters and applications and design of various filters.

UNIT I TRANSIENT ANALYSIS

Transient response of R, L & C circuits, Formulation of integral differential equations, Initial conditions, Transient Response of RL, RC and RLC (series and parallel) networks subjected to internal energy, Response to impulse, step, and ramp, exponential and sinusoidal excitations.

UNIT II ELECTRICAL CIRCUIT ANALYSIS USING LAPLACE TRANSFORMS

Application of Laplace Transforms to RL, RC and RLC (series and parallel) Networks for impulse, step, and ramp, exponential and sinusoidal excitations.

UNIT III TWO PORT NETWORK PARAMETERS

Open circuit impedance, short-circuit admittance, Transmission, Hybrid parameters & inter-relationships, Series, parallel and cascade connection of two port networks,System function, and Impedance and admittance functions.

UNIT IV FOURIER SERIES AND INTEGRAL

Fourier series representation of periodic functions, Symmetry conditions, Exponential Fourier series, Discrete spectrum, Fourier integral and its properties, Continuous spectrum,Application to simple networks

UNIT V FILTERS

Classification of filters – Low pass, High pass, Band pass and Band Elimination, Constant-k and M-derived filters-Low pass and High pass Filters and Band pass and Band elimination filters (Elementary treatment only)

TEXTBOOKS:

1. Van Valkenburg M.E, “Network Analysis”, Prentice Hall of India, 3rd Edition, 2000.
2. Ravish R Singh, “Network Analysis and Synthesis”, McGrawHill, 2nd Edition, 2019.

REFERENCE BOOKS:

1. B. Subramanyam, “Electric Circuit Analysis”, Dreamtech Press & Wiley, 2021.
2. James W. Nilsson, Susan A.Riedel, “Electric Circuits”, Pearson, 11th Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, “Circuits and Networks: Analysis and Synthesis”, McGraw Hill, 5th Edition, 2017.
4. Jagan N.C, Lakshrninarayana C., “Network Analysis”, B.S. Publications, 3rd Edition, 2014.
5. William Hayt H, Kimmerly Jack E. and Steven Durbin M, “Engineering Circuit Analysis”, McGraw Hill, 6th Edition, 2002.
6. Chakravarthy A., “Circuit Theory”, Dhanpat Rai & Co., First Edition, 1999

APPLIED PHYSICS LAB

I B. TECH II SEM **L T P C**
Course Code: A2AP212BS **0 0 3 1.5**

COURSE OBJECTIVES:

The objectives of this course for the student to

1. Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT,
3. LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
4. To understand the behaviour of Laser and to understand numerical aperture of an optical fibre.
5. Study the behavior of B-H curve of ferromagnetic materials.
6. Understanding the method of least squares fitting.

COURSE OUTCOMES:

The students will be able to:

1. Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
2. Appreciate quantum physics in semiconductor devices and opto electronics.
3. Understand the directional property of laser and numerical aperture of an optical fibre.
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Carried out data analysis.

LIST OF EXPERIMENTS:

1. Determination of work function and Planck's constant using photoelectric effect.
2. To determine Hall co-efficient and carrier concentration of a given semiconductor.
3. Characteristics of series and parallel LCR circuits.
4. V-I characteristics of a p-n junction diode and Zener diode.
5. Input and output characteristics of BJT (CE, CB & CC configurations).
6. a) To study the V-I and P-I characteristics of a Light Emitting Diode (LED).
   b) Plot V-I Characteristics of a solar cell.
7. Determination of Energy gap of a semiconductor.
8. Study B-H curve of a magnetic material.
9. a) Determination of the beam divergence of the given LASER beam.
   b) Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
10. To determine the rigidity modulus of the material of the given wire using Torsional pendulum.

Note: *Any 8 experiments are to be performed.*

REFERENCE BOOK:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

I B. TECH II SEM **L T P C**
Course Code: A2EN213HS **0 0 2 1**

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

COURSE OBJECTIVES:

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent,intonation and rhythm
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
4. To improve the fluency of students in spoken English and neutralize the impact ofdialects.
5. To train students to use language appropriately for public speaking, group discussionsand interviews

COURSE OUTCOMES:

Students will be able to:

1. Understand the nuances of English language through audio- visual experience and groupactivities
2. Neutralise their accent for intelligibility
3. Speak with clarity and confidence which in turn enhances their employability skills

Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:

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

Listening Skills:

Objectives

1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills:

Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professionalcontexts
   - Oral practice
   - Describing objects/situations/people
   - Role play – Individual/Group activities
   - Just A Minute (JAM) Session

The following course content is prescribed for the **English Language and Communication Skills Lab**.

Exercise – ICALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening. *Practice*:

Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs- Consonant Clusters- Past Tense Marker and Plural Marker- *Testing Exercises*

ICS Lab:

Understand: Spoken vs. Written language- Formal and Informal English.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – IICALL Lab:

Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern in sentences – Intonation.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences – Intonation - *Testing Exercises*

ICS Lab:

Understand: Features of Good Conversation – Strategies for Effective Communication.

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

Exercise - IIICALL Lab:

Understand: Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -*Testing Exercises*

ICS Lab:

Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing

Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise – IVCALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests - *Testing Exercises*

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication-Presentation Skills.

Practice: Making a Short Speech – Extempore- Making a Presentation.

Exercise – VCALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests -*Testing Exercises*

ICS Lab:

Understand: Group Discussion

Practice: Group Discussion Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the followingspecifications:

2. Computers with Suitable Configuration
3. High Fidelity Headphones

4. Interactive Communication Skills (ICS) Lab :

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio- visual aids with a Public Address System, a T. V. or LCD, a digital stereo –audio & video system and camcorder etc.

Source of Material (Master Copy):

- *Exercises in Spoken English. Part 1,2,3*. CIEFL and Oxford University Press

Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contentsof the syllabus.

Suggested Software:

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10th Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.

- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge UniversityPress.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- Digital All
- Orell Digital Language Lab (Licensed Version)

REFERENCE BOOKS:

1. (2022). *English Language Communication Skills – Lab Manual cum Workbook.* CengageLearning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook.* CambridgeUniversity Press
3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook.* Oxford UniversityPress
4. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities.* Orient Black Swan Pvt. Ltd.
5. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach.* CambridgeUniversity Press.

APPLIED PYTHON PROGRAMMING LAB

I B. TECH II SEM **L T P C**
Course Code: A2CS202ES **0 1 2 2**

COURSE OUTCOMES:

Upon completing this course, the students will be able to

1. Build basic programs using fundamental programming constructs
2. Write and execute python codes for different applications
3. Capable to implement on hardware boards

LIST OF EXPERIMENTS:

CYCLE - 1

1. Downloading and Installing Python and Modules
   a. Python 3 on Linux
   b. Follow the instructions given in the URL https://docs.python-guide.org/starting/install3/linux/
   c. Python 3 on Windows
   d. Follow the instructions given in the URL https://docs.python.org/3/using/windows.html(Please remember that Windows installation of Python is harder!)
   e. pip3 on Windows and Linux
   f. Install the Python package installer by following the instructions given in the URL https://www.activestate.com/resources/quick-reads/how-to-install-and-use-pip3/
   g. Installing numpy and scipy
   h. You can install any python3 package using the command pip3 install <packagename>
   i. Installing jupyterlab
   j. Install from pip using the command pip install jupyterlab
2. Introduction to Python3
   a. Printing your biodata on the screen
   b. Printing all the primes less than a given number
   c. Finding all the factors of a number and show whether it is a *perfect* number, i.e., the sumof all its factors (excluding the number itself) is equal to the number itself
3. Defining and Using Functions
   a) Write a function to read data from a file and display it on the screen
   b) Define a boolean function *is palindrome*(<input>)
   c) Write a function *collatz(x)* which does the following: if x is odd, $x = 3x + 1$; if x is even,then $x = x/2$. Return the number of steps it takes for $x = 1$
   d) Write a function $N(m, s) = exp(-(x-m)^2/(2s^2))/sqrt(2\pi)s$ that computes the Normaldistribution
4. The package numpy
   a) Creating a matrix of given order m x n containing *random numbers* in the range 1 to99999
   b) Write a program that adds, subtracts and multiplies two matrices. Provide an interfacesuch that, based on the prompt, the function (addition, subtraction, multiplication) should be performed
   c) Write a program to solve a system of n linear equations in n variables using matrix inverse
5. The package scipy and pyplot
   a) Finding if two sets of data have the same *mean* value
   b) Plotting data read from a file
   c) Fitting a function through a set a data points using *polyfit* function
   d) Plotting a histogram of a given data set
6. The strings package

a) Read text from a file and print the number of lines, words and characters
b) Read text from a file and return a list of all n letter words beginning with a vowel
c) Finding a secret message hidden in a paragraph of text
d) Plot a histogram of words according to their length from text read from a file

Cycle -2

7. Installing OS on Raspberry Pi
   a) Installation using PiImager
   b) Installation using image file
   - Downloading an Image
     - Writing the image to an SD card
     - using Linux
     - using Windows
     - Booting up

   Follow the instructions given in the URL
   https://www.raspberrypi.com/documentation/computers/getting-started.html
8. Accessing GPIO pins using Python

a) Installing GPIO Zero library.
   First, update your repositories list:
   sudo apt update
   Then install the package for Python 3:
   sudo apt install python3-gpiozero

b) Blinking an LED connected to one of the GPIO pin

c) Adjusting the brightness of an LED
   Adjust the brightness of an LED (0 to 100, where 100 means maximum brightness) using the in-built PWM wavelength.

9. Collecting Sensor Data

a) DHT Sensor interface

- Connect the terminals of DHT GPIO pins of Raspberry Pi.
- Import the DHT library using *import Adafruit_DHT*
- Read sensor data and display it on screen.

ELECTRICAL CIRCUIT ANALYSIS LABORATORY

I B. TECH II SEM **L T P C**
Course Code: A2EE216ES **0 0 2 1**

Prerequisites: Elements of Electrical Engineering & Electrical Circuit Analysis

COURSE OBJECTIVES:

1. To design electrical systems and analyze them by applying various Network Theorems
2. To measure three phase Active and Reactive power.
3. To understand the locus diagrams and concept of resonance.

COURSE OUTCOMES:

After learning the contents of this paper the student must be able to
1. Analyze complex DC and AC linear circuits
2. Apply concepts of electrical circuits across engineering
3. Evaluate response of a given network by using theorems.

The following experiments are required to be conducted as compulsory
1. To draw the locus Diagrams of RL (R-Varying) and RC (R-Varying) Series Circuits.
2. Verification of Series and Parallel Resonance.
3. Determination of Time response of first order RL and RC circuit for periodic non –sinusoidal inputs – Time Constant and Steady state error.
4. Determination of Two port network parameters – Z & Y parameters.
5. Determination of Two port network parameters – A, B, C, D parameters.
6. Determination of Co-efficient of Coupling and Separation of Self and Mutualinductance in a Coupled Circuits.
7. Frequency domain analysis of Low-pass filter.
8. Frequency domain analysis of Band-pass filter.

In addition to the above eight experiments from the following list are required to be conducted

1. Harmonic Analysis of non-sinusoidal waveform signals using Harmonic Analyzerand plotting frequency spectrum.

II-YEAR (I-SEMESTER)

NUMERICAL METHODS AND COMPLEX VARIABLES

II B.Tech-I Semester **L T P C**
Course Code: A2MA301BS **3 1 0 4**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Expressing periodic function by Fourier series and a non-periodic function by Fourier transforms
2. Various numerical methods to find roots of polynomial and transcendental equations.
3. Concept of finite differences and to estimate the value for the given data using interpolation.
4. Evaluation of integrals using numerical techniques
5. Solving ordinary differential equations of first order using numerical techniques.
6. Differentiation and integration of complex valued functions.
7. Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
8. Expansion of complex functions using Taylor's and Laurent's series.

COURSE OUTCOMES:

After learning the contents of this paper the student must be able to

1. Express any periodic function in terms of sine and cosine
2. Find the root of a given polynomial and transcendental equations.
3. Estimate the value for the given data using interpolation
4. Find the numerical solutions for a given first order ODE's
5. Analyze the complex function with reference to their analyticity, integration using Cauchy'sintegral and residue theorems
6. Taylor's and Laurent's series expansions in complex function

UNIT I FOURIER SERIES &FOURIER TRANSFORMS:

Fourier series - Dirichlet's Conditions - Half-range Fourier series - Fourier Transforms: Fourier Sine and cosine transforms - Inverse Fourier transforms.

UNIT II NUMERICAL METHODS-I

Solution of polynomial and transcendental equations: Bisection method, Iteration Method, Newton- Raphson method and Regula-Falsi method. Jacobi and Gauss-Seidal iteration methods for solving linear systems of equations.

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

UNIT III NUMERICAL METHODS-II

Numerical integration: Trapezoidal rule and Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.

Ordinary differential equations: Taylor's series, Picard's method, Euler and modified Euler's methods, Runge-Kutta method of fourth order for first order ODE

UNIT IV COMPLEX DIFFERENTIATION

Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne-Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate, elementary analytic functions (exponential, trigonometric, logarithm) and their properties. (All theorems without Proofs), Conformal mappings, Mobius transformations.

UNIT V COMPLEX INTEGRATION:

Line integrals, Cauchy's theorem, Cauchy's Integral formula, zeros of analytic functions, singularities, Taylor's series, Laurent's series, Residues, Cauchy Residue theorem.and their properties. (All theorems without Proofs)

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

REFERENCE BOOKS:

1. M. K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computations, New Age International publishers.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Edition, Mc-Graw Hill,2004.

WEB REFERENCES:

1. https://www.nptel.swayam.ac.in
2. Story of Stuff, http://www.storyofstuff.com

POWER SYSTEM - I

II B.Tech-I Semester **L T P C**
Course Code:A2EE302PC **3 0 0 3**

COURSE OBJECTIVES:

1. To understand the power generation through conventional and non-conventional sources.
2. To illustrate the economic aspects of power generation and tariff methods.
3. To know about overhead line insulators, substations and AC & DC distribution systems.

COURSE OUTCOMES:

After learning the contents of this paper the student must be able to
1. Understand the operation of conventional and renewable electrical power generating stations.
2. Evaluate the power tariff methods and Economics associated with power generation.
3. Analyze the operations of AIS & GIS, Insulators and Distribution systems.

UNIT I GENERATION OF ELECTRIC POWER:

Conventional Sources (Qualitative): Hydro station, Steam Power Plant, Nuclear Power Plant and GasTurbine Plant.

Non-Conventional Sources (Elementary Treatment):

Solar Energy, Wind Energy, Fuel Cells, Ocean Energy, Tidal Energy, Wave Energy, Cogeneration, Energy conservation and storage.

UNIT II ECONOMICS OF POWER GENERATION:

Introduction, definitions of connected load, maximum demand, demand factor, load factor, diversity factor, oad duration curve, number and size of generator units. Base load and peak load plants. Cost of electrical energy-fixed cost, running cost, Tariff on charge to customer.

UNIT III OVER HEAD TRANSMISSION LINES:

Line conductors, inductance and capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacing, Composite conductors- transposition, bundled conductors, and effect of earth on capacitance,skin and proximity effects.

OVERHEAD LINE INSULATORS: Introduction, types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, testing of insulators, Sag and tension calculations.

UNIT IV SUBSTATIONS

AIR INSULATED SUBSTATIONS (AIS):

Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams.

GAS INSULATED SUBSTATIONS (GIS): Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, bus bar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gasinsulated substations.

UNIT V DC DISTRIBUTION:

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

A.C. DISTRIBUTION: Introduction, AC distribution, Single phase, 3-phase, 3 phase 4 wire system, bus bar arrangement, Selection of site for substation. 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.

TEXT BOOKS:

1. C.L. Wadhwa, "Generation, Distribution and Utilization of Electrical Energy", 2nd Edition,New AgeInternational, 2009.
2. V.K Mehta andRohit Mehta, "Principles of Power Systems", S. Chand & Company Ltd, NewDelhi, 2004.

REFERENCE BOOKS:

1. Chakrabarti, M.L. Soni, P.V. Gupta, U.S. Bhatnagar, "A Text book on Power System Engineering", Dhanpat Rai Publishing Company (P) Ltd, 2008.
2. C.L. Wadhwa, "Electrical Power Systems", 5th Edition, New Age International, 2009.
3. M.V. Deshpande, "Elements of Electrical Power Station Design", 3rd Edition, Wheeler Pub.1998.
4. H.Cotton & H. Barber, "The Transmission and Distribution of Electrical Energy", 3rd Edition,1970.
5. W.D.Stevenson, "Elements of Power System Analysis", 4th Edition, McGraw Hill, 1984.

WEB REFERENCES:

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E-TEXT BOOK:

https://www.studynama.com/community/threads/power-systems--quick-revision-pdf-notes-book-ebook-for-electrical-engineering-free-download.347/

MOOCS COURSE:

https://nptel.ac.in/courses/108/105/108105067/

ANALOG ELECTRONIC CIRCUITS

II B.Tech-I Semester **L T P C**
Course Code:A2EC309ES **3 0 0 3**

COURSE OBJECTIVES:

1. To introduce components such as diodes, BJTs and FETs their switching characteristics,applications
2. Learn the concepts of high frequency analysis of transistors.
3. To give understanding of various types of basic and feedback amplifier circuits such assmall signal, cascaded, large signal and tuned amplifiers.
4. To introduce the basic building blocks of linear integrated circuits.
5. To introduce the concepts of waveform generation and introduce some special function ICs.

COURSE OUTCOMES:

1. At the end of this course, students will be able to
2. Know the characteristics, utilization of various components.
3. Understand the biasing techniques
4. Design and analyze various rectifiers, small signal amplifier circuits.
5. Design sinusoidal and non-sinusoidal oscillators.
6. Designs OP-AMP based circuits with linear integratedcircuits.

UNIT I DIODE AND BIPOLAR TRANSISTOR CIRCUITS

P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, clamping and clipping circuits. Input output characteristics of BJT in CB, CE, CC configurations, biasing circuits, Load line analysis, common-emitter, common-base andcommon collector amplifiers;Small signal equivalent circuits,

UNIT-II FET CIRCUITS

FET Structure and VI Characteristics, MOSFET structure and I-V characteristics. MOSFET as a switch. small signal equivalent circuits - gain, input and output impedances, small-signal model and common-source, common-gate and common-drain amplifiers, trans conductance, high frequencyequivalent circuit.

UNIT-III MULTI-STAGE AND POWER AMPLIFIERS

Direct coupled and RC Coupled multi-stage amplifiers; DifferentialAmplifiers, Power amplifiers - Class A,Class B,ClassC

UNIT-IV FEEDBACK AMPLIFIERS

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

Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators.

UNIT-V OPERATIONAL AMPLIFIERS

Ideal op-amp, Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product, Inverting and non-inverting amplifier, Differentiator, integrator, Square-wave andtriangular- wave generators.

TEXT BOOKS:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education, 2nd edition2010
2. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.

REFERENCE BOOKS:

1. Electronic Devices Conventional and current version -Thomas L. Floyd 2015, pearson.
2. J. Millman and A. Grabel, “Microelectronics”, McGraw Hill Education, 1988.
3. P. Horowitz and W. Hill, “The Art of Electronics”, Cambridge University Press, 1989.
4. P. R. Gray, R. G. Meyer and S. Lewis, “Analysis and Design of Analog IntegratedCircuits”,John Wiley & Sons, 2001.

WEB REFERENCES:

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2. https://onlinelibrary.wiley.com/doi/book/10.1002/0471722901

E-TEXT BOOK:

1. https://www.studynama.com/community/threads/analog electronics-quick-revision-pdf-notes-book-ebook-for-electrical-engineering-free-download.347/

MOOCS COURSE:

1. https://nptel.ac.in/courses

ELECTRICAL MACHINES – I

II B.Tech-I Semester **L T P C**

Course Code: A2EE303PC **3 1 0 4**

COURSE OBJECTIVES:

1. To study and understand different types of DC machines and their performance evaluation through various testing methods.
2. To understand the operation of single and ploy-phase Transformers
3. To analyze the performance of transformers through various testing methods.

COURSE OUTCOMES:

After learning the contents of this paper the student must be able to

1. Identify different parts of a DC machines & understand their operation.
2. Carry out different excitation, starting, speed control methods and testing of DC machines.
3. Analyze single & three phase transformers and their performance through testing.

UNIT I 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. Armature reaction – Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation. 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-excited and remedial measures. Load characteristics and applications ofshunt, series and compound generators.

UNIT II D.C MOTORS

Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation. Speed control of D.C. Motors - Armature voltage and field flux control methods.

Motor starters (3- point and 4- point starters) Testing of D.C. machines - Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency.

UNIT III TESTING OF DC MACHINES

Methods of Testing – direct, indirect, and regenerative testing – Brake test – Swinburne's test – Hopkinson's test – Field's test - separation of stray losses in a D.C. motor test.

UNIT IV SINGLE PHASE TRANSFORMERS

Types - constructional details-minimization of hysteresis and eddy current losses- EMF equation - operation on no load and on load - phasor diagrams and Applications.

Equivalent circuit - losses and efficiency – regulation - All day efficiency - effect of variations of frequency &supply voltage on iron losses.

UNIT V TESTING OF TRANSFORMERS AND POLY-PHASE TRANSFORMERS

Open Circuit and Short Circuit tests - Sumpner's test - predetermination of efficiency and regulation-separation of losses test- parallel operation with equal and unequal voltage ratios - auto transformers-equivalent circuit - comparison with two winding transformers.

Poly-phase transformers – Poly-phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ, Scott connection and Applications.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, "Electrical Machines", Oxford, 2017.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
4. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers,2004.

WEB REFERENCES:

1. https://www.freebookcentre.net/Electronics/electricalmachiness-Books.html
2. https://nptel.ac.in/courses/108/102/108102145/

E-TEXT BOOK:

1. http://site.iugaza.edu.ps/malramlawi/files/khanna_electricalmachines1_Handbook.pdf

MOOCS COURSE:

1. https://swayam.gov.in/
2. https://onlinecourses.nptel.ac.in/

ELECTRO MAGNETIC FIELDS

II B.Tech-I Semester **L T P C**
Course Code:A2EE304PC **3 0 0 3**

COURSE OBJECTIVES:

1. To introduce the concepts of electric field and magnetic field.
2. To know Applications of electric and magnetic fields in the development of the theory for power transmission linesand electrical machines.
3. To study about electromagnetic waves.

COURSE OUTCOMES:

After learning the contents of this paper the student must be able to

1. Understand the basic laws of electromagnetism and their applications.
2. Analyze time varying electric and magnetic fields.
3. Understand the propagation of EM waves.

UNIT I STATIC ELECTRIC FIELD

Review of conversion of a vector from one coordinate system to another coordinate system, Coulomb's law, Electricfield intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions. Gauss law andits applications. Absolute Electric potential, potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density.

UNIT-II CONDUCTORS, DIELECTRICS AND CAPACITANCE:

Current and current density, Ohms Law in Point form, Continuity equation, Boundary conditions of conductors and dielectric materials. Capacitance, Capacitance of a two-wire line, Poisson's equation, Laplace's equation, Solution of Laplace and Poisson's equation.

UNIT-III STATIC MAGNETIC FIELDS AND MAGNETIC FORCES:

Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potentials. Steady magnetic fields produced bycurrent carrying conductors.
Force on a moving charge, Force on a differential current element, Force between differential current elements, Magnetic boundary conditions, Magnetic circuits, Self-inductances and mutual inductances.

UNIT-IV TIME VARYING FIELDS AND MAXWELL'S EQUATIONS:

Faraday's law for Electromagnetic induction, Displacement current, Point form of Maxwell's equation, Integral form of Maxwell's equations,Motional Electromotive forces.

UNIT-V ELECTROMAGNETIC WAVES

Derivation of Wave Equation, Uniform Plane Waves, Maxwell's equation in Phasor form, Wave equation in Phasor form, Plane wave in free space and in a homogenous material. Wave equation for a conducting medium, Plane waves in lossy dielectrics, Propagation in good conductors. Poynting theorem.

TEXT BOOKS:

1. M. N. O. Sadiku, "Elements of Electromagnetics", Oxford University Publication, 2014.
2. W. Hayt, "Engineering Electromagnetics", McGraw Hill Education, 2012.

REFERENCE BOOKS:

1. G. W. Carter, "The electromagnetic field in its engineering aspects", Longmans, 1954.
2. W. J. Duffin, "Electricity and Magnetism", McGraw Hill Publication, 1980.
3. W. J. Duffin, "Advanced Electricity and Magnetism", McGraw Hill, 1968.
4. E. G. Cullwick, "The Fundamentals of Electromagnetism", Cambridge University Press, 1966.

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2. https://onlinelibrary.wiley.com/doi/book/10.1002/0471722901

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MOOCS COURSE:

1. https://nptel.ac.in/courses/

ELECTRICAL MACHINES LABORATORY – I

II B.Tech-I Semester **L T P C**

Course Code: A2EE305PC **0 0 2 1**

COURSE OBJECTIVES:

1. To expose the students to the operation of DC Generators.
2. To know the operation of various types of DC Motors.
3. To examine the performance of Single and Three Phase Transformers.

COURSE OUTCOMES:

After learning the contents of this paper the student must be able to

1. Start and control the Different DC Machines.
2. Assess the performance of different machines using different testing methods
3. Evaluate the performance of different Transformers using different testing methods

The following experiments are required to be conducted compulsory experiments:

1. Magnetization characteristics of DC shunt generator (Determination of critical field resistanceand critical speed)
2. Load test on DC shunt generator (Determination of characteristics)
3. Load test on DC series generator (Determination of characteristics)
4. Hopkinson's test on DC shunt machines (Predetermination of efficiency)
5. Swinburne's test and speed control of DC shunt motor (Predetermination of efficiencies)
6. Brake test on DC compound motor (Determination of performance curves)
7. OC and SC Test on Single Phase Transformer
8. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)

In addition to the above eight experiments, at least any two of the experiments from the followinglist arerequired to be conducted:

1. Brake test on DC shunt motor (Determination of performance curves)
2. Load test on DC compound generator (Determination of characteristics.
3. Fields test on DC series machines (Determination of efficiency)
4. Retardation test on DC shunt motor (Determination of losses at rated speed)
5. Separation of losses in DC shunt motor.
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of aSingle-PhaseTransformer
7. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, "Electrical Machines", Oxford, 2017.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
4. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers,2004.

ANALOG ELECTRONIC CIRCUITS LABORATORY

II B.Tech-I Semester **L T P C**
Course Code: A2EC310ES **0 0 2 1**

COURSE OBJECTIVES:

1. To introduce components such as diodes, BJTs and FETs their switching characteristics,applications
2. Learn the concepts of high frequency analysis of transistors.
3. To give understanding of various types of basic and feedback amplifier circuits such assmall signal, cascaded, large signal and tuned amplifiers.
4. To introduce the basic building blocks of linear integrated circuits.
5. To introduce the concepts of waveform generation and introduce some special function ICs.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

1. Know the characteristics, utilization of various components.
2. Understand the biasing techniques
3. Design and analyze various rectifiers, small signal amplifier circuits.
4. Design sinusoidal and non-sinusoidal oscillators.
5. Design OP-AMP based circuits with linear integrated circuits.

LIST OF EXPERIMENTS:

1. Draw the VI Characteristics of given PN Junction diode. Determine the Static and Dynamicresistance of theDiode.
2. Determine the Ripple factor, %Regulation PIV and TUF of the given Rectifier with & withoutfilter.
3. Obtain the I/O Characteristics of CE configurations of BJT. Calculate h-parameters from theCharacteristics.
4. Obtain the I/O Characteristics of CB configurations of BJT. Calculate h-parameters from theCharacteristics.
5. Obtain the I/O Characteristics of CC configurations of BJT. Calculate h-parameters from theCharacteristics.
6. Obtain the Drain and Transfer characteristics of CD,CS configuration of JFET. Calculategm, rd fromthe Characteristics Adder and Subtractor using Op Amp.
7. Inverting and Non-inverting Amplifiers using Op Amps
8. Adder and Subtractor using Op Amp
9. Integrator Circuit using IC 741.
10. Differentiator circuit using Op Amp.
11. Current Shunt Feedback amplifier
12. Design an RC phase shift oscillator circuit and derive the gain condition for oscillationspractically for given frequency.
13. Design a Colpitts oscillator circuit for the given frequency and draw the output waveform.
14. Design transformer coupled class A power amplifier and draw the input and outputwaveforms, find its efficiency

ELECTRICAL SIMULATION TOOLS LABORATORY

II B.Tech-I Semester **L T P C**
Course Code: A2EE306PC **0 0 2 1**

COURSE OBJECTIVES:

1. To understand basic block sets of different simulation platform used in electrical/electroniccircuit design.
2. To understand use and coding in different software tools used in electrical/ electronic circuitdesign.
3. To understand the simulation of electric machines/circuits for performance analysis.

COURSE OUTCOMES:

After learning the contents of this paper the student must be able to

1. Develop knowledge of software packages to model and program electrical and electronicssystems.
2. Model different electrical and electronic systems and analyze the results.
3. Articulate importance of software packages used for simulation in laboratory experimentationby analyzing the simulation results.

Students should be encouraged to use open-source software's such as **SCILAB, ORCAD, LTSPICE, Ngspice, Octave, Solve Elec, Simulide, CircuitLab, QElectroTech, Circuit Sims, DcAcLab, Every Circuit, DoCircuits**etc. for carrying out the lab simulation listed below.

Use of Professional Licensed versions of softwares **like MATLAB, LabVIEW, NI Multisim, PSpice,PowerSim, TINA** etc. is also allowed.

Use of **'Python'** platform for simulating components/ circuit behaviour.

Suggested List of Laboratory Experiments:

The following experiments need to be performed from various subject domains.

1. Introduction to basic block sets of simulation platforms. Basic matrix operations, Generation of standard test signals
2. Solving thelinear and nonlinear differential equations
3. Measurement of Voltage, Current and Power in DC circuits.
4. Verification of different network theorems with dependent and independent sources using suitable simulation tools.
5. Verification of performance characteristics of basic Electronic Devices using suitable simulationtools.
6. Analysis of series and parallel resonance circuits using suitable simulation tools
7. Obtaining the response of electrical network for standard test signals using suitable simulationtools.
8. Modeling and Analysis of Low pass and High pass Filters using suitable simulation tools
9. Performance analysis of DC motor using suitable simulation tools
10. Modeling and analysis of Equivalent circuit of transformer using suitable simulation tools.
11. Analysis of single-phase bridge rectifier with and without filter using suitable Simulation tools.
12. Modeling and Verification of Voltage Regulator using suitable simulation tools.
13. Modeling of transmission line using simulation tools.
14. Performance analysis of Solar PV model using suitable simulation tools

GENDER SENSITIZATION LAB

II B.Tech-I Semester **L T P C**
Course Code: A2EE301MC **0 0 2 0**

COURSE DESCRIPTION

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions aboutsex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

OBJECTIVES OF THE COURSE

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

COURSE OUTCOMES

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
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.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labor and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals.
6. Students will develop a sense of appreciation of women in all walks of life.
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-Housework: 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- Further Reading: "*Chupulu".*

Domestic Violence: Speaking OutIs 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 Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. 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".

ESSENTIAL READING: The Textbook, "*Towards a World of Equals: A Bilingual Textbook on Gender"* written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, GoguShyamala, Deepa Sreenivas and Susie Tharu **published by Telugu Akademi, Telangana Government in 2015.**

ASSESSMENT AND GRADING:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

II-YEAR (II-SEMESTER)

SOLID MECHANICS AND HYDRAULIC MACHINES

II B.Tech-II Semester **L T P C**

Course Code: A2ME401ES **3 1 0 4**

COURSE OBJECTIVES:

1. To identify an appropriate structural system and work comfortably with basic engineeringmechanics and types of loading & support conditions that act on structural systems.
2. To Understand the meaning of centers of gravity, centroids, moments of Inertia and rigidbody dynamics.
3. To Study the characteristics of hydroelectric power plant and Design of hydraulic machinery.

COURSE OUTCOMES:

After learning the contents of this paper the student must be able to

1. Solve problems dealing with forces, beam and cable problems and understand distributedforce systems.
2. Solve friction problems and determine moments of Inertia and centroid of practical shapes.
3. Apply knowledge of mechanics in addressing problems in hydraulic machinery and its principlesthat will be utilized in Hydropower development and for other practical usages.

UNIT–I INTRODUCTION OF ENGINEERING MECHANICS:

Basic concepts of System of Forces-Coplanar Forces–Components in Space–Resultant- Moment of Forces andits Application – Couples and Resultant of Force System-Equilibrium of System of Forces-Free body diagrams-Direction of Force Equations of Equilibrium of Coplanar Systems and Spatial Systems – Vector cross product- Support reactions different beams for different types of loading – concentrated, uniformly distributedand uniformly varying loading. Types of friction – Limiting friction – Laws of Friction – static and Dynamic Frictions – Angle of Friction –Cone of limiting friction

UNIT–II CENTROID AND CENTER OF GRAVITY:

Centroids – Theorem of Pappus- Centroids of Composite figures – Centre of Gravity of Bodies – Area momentof Inertia:– polar Moment of Inertia–Transfer– Theorems - Moments of Inertia of Composite Figures.

SIMPLE STRESSES AND STRAINS ANALYSIS: Concept of stress and strain- St. Venant's Principle- Stress and Strain Diagram - Elasticity and plasticity – Types of stresses and strains- Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Pure shear and Complementary shear - Elastic modulii, Elasticconstants and the relationship between them

UNIT–III KINEMATICS & KINETICS:

Introduction – Rectilinear motion – Motion with uniform and variable acceleration–Curvilinear motion– Components of motion– Circular motion Kinetics of a particle – D'Alembert's principle – Motion in a curved path – work, energy and power. Principleof conservationof energy – Kinetics of a rigid body in translation, rotation – work done – Principle of work-energy – Impulse-momentum.

UNIT-IV BASICS OF HYDRAULIC MACHINERY

Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, Jet striking centrally and at tip, Velocity triangles at inlet and outlet, expressions for work done and efficiency Elements of a typical Hydropower installation – Heads and efficiencies

UNIT-V TURBINES & PUMPS

Classification of turbines – Pelton wheel – Francis turbine – Kaplan turbine –working, working proportions, velocity diagram, work done and efficiency, hydraulic design. Draft tube
– Classification, functions and efficiency. Governing of turbines, Performance of turbines
Pump installation details – classification – work done – Manometric head – minimum starting speed –losses and efficiencies – specific speed. Multistage pumps – pumps in parallel

TEXT BOOKS:

1. M.V. Seshagirirao and Durgaih, "Engineering Mechanics",University Press.
2. P.N Modi and Seth, "Fluid Mechanics and Hydraulic Machinery", standard Book House

REFERENCE BOOKS:

A. Bhattacharya, "Engineering Mechanics", Oxford University Publications.
1. Hibbler, "Engineering Mechanics (Statics and Dynamics)", Pearson Education.
2. Fedrinand L. Singer, "Engineering Mechanics" Harper Collings Publishers.
3. A.K.Tayal, "Engineering Mechanics", Umesh Publication.
4. Domkundwar & Domkundwar, "Fluid mechanics & Hydraulic Machines", Dhanpat Rai & C
5. R.C.Hibbeler, "Fluid Mechanics", Pearson India Education Servieces Pvt. Ltd
6. D.S.Kumar, "Fluid Mechanic & Fluid Power Engineering", Kataria & Sons Publications Pvt. Ltd.
7. Banga & Sharma, "Hydraulic Machines" Khanna Publishers.

WEB REFERENCES:

1. https://www.mv.helsinki.fi/home/tpaulin/Text/hveng.pdfhttps://www.mv.helsinki.fi/home/tpaulin/Text/hveng.pdf
2. https://www.elsevier.com/books/high-voltage-engineering/hammond/978-0-08-024212-5

E TEXT BOOKS:

1. https://learnengineering.in/Solid mechanics and hydraulic machines-books/
2. https://www.mv.helsinki.fi/home/tpaulin/Text/hveng.pdf

MOOCS COURCE:

1. https://nptel.ac.in/courses
2. https://www.coursera.org/browse/Solid mechanics and hydraulic machines/electrical-engineering

MEASUREMENTS AND INSTRUMENTATION

II B.Tech-II Semester **L T P C**
Course Code: A2EE401PC **3 0 0 3**

COURSE OBJECTIVES:

1. To introduce the basic principles of all measuring instruments.
2. To deal with the measurement of voltage, current, Power factor, power, energy andmagnetic measurements.
3. To understand the basic concepts of smart and digital metering.

COURSE OUTCOMES:

After learning the contents of this paper the student must be able to

1. Understand different types of measuring instruments, their construction, operation andcharacteristics and identify the instruments suitable for typical measurements.
2. Apply the knowledge about transducers and instrument transformers to use them effectively.
3. Apply the knowledge of smart and digital metering for industrial 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 rangeusing shunts and series resistance. Electrostatic Voltmeters-electrometer type and attracted disc type – extension of range of E.S. Voltmeters.

UNIT-II POTENTIOMETERS & INSTRUMENT TRANSFORMERS:

Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate type's standardization – applications. CT and PT – Ratioand phase angle errors

UNIT-III MEASUREMENT OF POWER & ENERGY:

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 andreactive powers in balanced and unbalanced systems.

Single phase induction type energy meter – driving and braking torques – errors and compensations – testing by phantom loading using R.S.S. meter. Three phase energy meter – tri-vector meter, maximumdemand meters.

UNIT-IV DC & AC BRIDGES:

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.

Measurement of inductance- Maxwell's bridge, Hay's bridge, Anderson's bridge - Owen's bridge. Measurement of capacitance and loss angle –Desaunty's Bridge - Wien's bridge – Schering Bridge.

UNIT-V TRANSDUCERS:

Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, and photo diodes.

INTRODUCTION TO SMART AND DIGITAL METERING: Digital Multi-meter, True RMS meters, Clamp- on meters, Digital Energy Meter, Cathode Ray Oscilloscope, Digital Storage Oscilloscope.

TEXTBOOKS:

1. K. Sawhney, "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co.Publications,2005.
2. Dr. Rajendra Prasad, "Electrical Measurements & Measuring Instruments", Khanna Publishers1989.

REFERENCE BOOKS:

1. G. K. Banerjee, "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2nd Edition,2016.
2. R. K. Rajput, "Electrical & Electronic Measurement & Instrumentation", S. Chand andCompany Ltd.,2007.
3. S. C. Bhargava, "Electrical Measuring Instruments and Measurements", BS Publications, 2012.
4. Buckingham and Price, "Electrical Measurements", Prentice – Hall, 1988.
5. Reissland, M. U, "Electrical Measurements: Fundamentals, Concepts, Applications", New AgeInternational (P) Limited Publishers, 1st Edition 2010.
6. E.W. Golding and F. C. Widdis, "Electrical Measurements and measuring Instruments",fifth Edition,Wheeler Publishing, 2011.

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1. https://www.mv.helsinki.fi/home/tpaulin/Text/hveng.pdfhttps://www.mv.helsinki.fi/home/tpaulin/Text/hveng.pdf
2. https://www.elsevier.com/books/high-voltage-engineering/hammond/978-0-08-024212-5

E TEXT BOOKS:

1. https://learnengineering.in/high-voltage-engineering-books/
2. https://www.mv.helsinki.fi/home/tpaulin/Text/hveng.pdf

MOOCS COURCE:

1. https://nptel.ac.in/courses/
2. https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering

ELECTRICAL MACHINES – II

II B.Tech-II Semester **L T P C**
Course Code: A2EE402PC **3 0 0 3**

Prerequisites: Electrical Circuit Analysis-1 & Electrical Circuit Analysis-2 & Electrical Machines-I

COURSE OBJECTIVES:

1. To deal with the detailed analysis of poly-phase induction motors & Alternators.
2. To understand operation, construction and types of single-phase motors and their applications in household appliances and control systems.
3. To introduce the concept of parallel operation of alternators.

COURSE OUTCOMES:

After learning the contents of this paper the student must be able to
1. Understand the concepts of rotating magnetic fields.
2. Examine the operation of ac machines.
3. Analyze performance characteristics of ac machines.

UNIT-I POLY-PHASE INDUCTION MACHINES:

Constructional details of cage and wound rotor machines- production of a rotating magnetic field - principle of operation - rotor EMF and rotor frequency - rotor reactance, rotor current and Power factor at standstill and during operation. Rotor power input, rotor copper loss and mechanical power developed and their inter relation.

UNIT-II CHARACTERISTICS OF INDUCTION MACHINES

Torque equation-expressions for maximum torque and starting torque - torque slip characteristic - equivalent circuit - phasor diagram - crawling and cogging, No-load Test and Blocked rotor test –Predetermination of performance-Methods of starting and starting current and Torque calculations, Applications.

SPEED CONTROL METHODS: Change of voltage, change of frequency, voltage/frequency, injection of an EMF into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

UNIT-III SYNCHRONOUS MACHINES:

Constructional Features of round rotor and salient pole machines – Armature windings – Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors – E.M.F Equation. Harmonics in generated e.m.f. – suppression of harmonics – armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics.

Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods – salient pole alternators – two reaction analysis – experimental determination of X_d and X_q (Slip test) Phasor diagrams – Regulation of salient pole alternators.

UNIT-IV PARALLEL OPERATION OF SYNCHRONOUS MACHINES:

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 reactance's and Applications.

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.

UNIT-V SINGLE PHASE MACHINES:

Single phase induction motor – Constructional Features-Double revolving field theory – split-phase motors – AC series motor- Universal Motor- -Shadedpole motor andApplications.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, “Electrical Machines”, Oxford, 2017.
2. M. G. Say, “Performance and design of AC machines”, CBS Publishers, 2002.
1. E. Fitzgerald and C. Kingsley, "Electric Machinery”, New York, McGraw Hill Education, 2013.
2. E. Clayton and N. N. Hancock, “Performance and design of DC machines”, CBS Publishers,2004.

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2. https://www.elsevier.com/books/high-voltage-engineering/hammond/978-0-08-024212-5

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1. https://learnengineering.in/high-voltage-engineering-books/
2. https://www.mv.helsinki.fi/home/tpaulin/Text/hveng.pdf

MOOCS COURCE:

1. https://nptel.ac.in/courses/108/104/108104048/
2. https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering

DIGITAL ELECTRONICS

II B.Tech-II Semester **L T P C**
Course Code: A2EC408ES **2 0 0 2**

Prerequisites: Analog Electronics

COURSE OBJECTIVES:

1. To learn fundamental concepts of digital system design and common forms of numberrepresentations and their conversions.
2. To implement and design logical operations using combinational logic circuits and sequentiallogic circuits.
3. To understand the semiconductor memories and programmable logic devices.

COURSE OUTCOMES:

After learning the contents of this paper the student must be able to

1. Understand the working of logic families and logic gates.
2. Design and implement Combinational and Sequential logic circuits.
3. Implement the given logical problems using programmable logic devices.

UNIT-I FUNDAMENTALS OF DIGITAL SYSTEMS AND LOGIC FAMILIES:

Digital signals, Digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, Examples of IC gates, Number systems-binary, Signed binary, Octal hexadecimal number, Binary arithmetic, One's and Two's complements arithmetic.

UNIT-II COMBINATIONAL CIRCUITS-I:

Standard representation for logic functions, K-map representation and simplification of logic functions using K- map, Minimization of logical functions, Don't care conditions, Multiplexer, De-Multiplexer

UNIT-III COMBINATIONAL CIRCUITS-II:

Adders, Subtractors, Carry look ahead adder, Digital comparator, Parity checker/generator, Code converters, Priority encoders, Decoders/Drivers for display devices, Q-M method of function realization.

UNIT-IV SEQUENTIAL CIRCUITS:

Introduction to flip-flops, SR, JK, T and D type's flip-flops, Shift registers, Conversion of flip-flops, Ring counter, Ripple (Asynchronous) counters, Synchronous counters.

UNIT-V SEMICONDUCTOR MEMORIES AND PROGRAMMABLE LOGIC DEVICES:

Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read-only memory (ROM), ROM types, Read and write memory (RAM) types, Programmable logic array, Programmable array logic, Field Programmable Gate Array (FPGA).

TEXT BOOKS:

1. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

REFERENCE BOOKS:

1. R.S. Sedha, "A Textbook of Digital Electronics", S.Chand, 2005
2. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

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1. https://www.mv.helsinki.fi/home/tpaulin/Text/hveng.pdfhttps://www.mv.helsinki.fi/home/tpaulin/Text/hveng.pdf
2. https://www.elsevier.com/books/high-voltage-engineering/hammond/978-0-08-024212-5

E TEXT BOOKS:

3. https://learnengineering.in/high-voltage-engineering-books/
4. https://www.mv.helsinki.fi/home/tpaulin/Text/hveng.pdf

MOOCS COURCE:

3. https://nptel.ac.in/courses/108/104/108104048/
4. https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering

POWER SYSTEMS - II

IIB.Tech-II Semester **L T P C**
Course Code: A2EE403PC **3 0 0 3**

Prerequisites: Power Systems –I & Electro Magnetic Fields

COURSE OBJECTIVES:

1. To study the performance of transmission lines and travelling waves.
2. To understand the concept of voltage control, compensation methods and per unitrepresentation of power systems.
3. To know the methods of overvoltage protection, Insulation coordination, Symmetricalcomponents and fault calculation analysis.

COURSE OUTCOMES:

After learning the contents of this paper the student must be able to

1. Analyze transmission line performance and Apply load compensation techniques to controlreactive power.
2. Understand the application of per unit quantities in power systems.
3. Design over voltage protection, insulation coordination and determine the fault currents for symmetrical and unbalanced faults.

UNIT – I PERFORMANCE OF LINES

Representation of lines, short transmission lines, medium length lines, nominal T and PI- representations, long transmission lines. The equivalent circuit representation of a
long Line, A, B, C, D constants, Ferranti Effect.

Corona: Introduction, disruptive critical voltage, corona loss, Factors affecting corona loss and methods of reducing corona loss, Disadvantages of corona, interference between power and Communication lines.

UNIT-II VOLTAGE CONTROL & POWER FACTOR IMPROVEMENT:

Introduction – methods of voltage control, shunt and series capacitors / Inductors, tap changing transformers, synchronous phase modifiers, power factor improvement methods.

COMPENSATION IN POWER SYSTEMS: Introduction - Concepts of Load compensation – Load ability characteristics of overhead lines – Uncompensated transmission line – Symmetrical line – Radial line with asynchronous load – Compensation of lines.

UNIT-III PER UNIT REPRESENTATION OF POWER SYSTEMS:

The one-line diagram, impedance and reactance diagrams, per unit quantities, changing the base of per unit quantities, advantages of per unitsystem.

TRAVELLING WAVES ON TRANSMISSION LINES: Production of travelling waves, open circuited line, short-circuited line, line terminated through a resistance, line connected to a cable, reflection and refraction at T-junction line terminated through a capacitance, capacitor connection at a T-junction, Attenuation of travelling waves.

UNIT-IV OVERVOLTAGE PROTECTION AND INSULATION COORDINATION:

Over voltage due to arcing ground and Peterson coil, lightning, horn gaps, surge diverters, rod gaps, expulsion type lightning arrester, valve type lightning arrester, ground wires, ground rods, counter poise, surge absorbers, insulation coordination, volt-time curves.

UNIT-V SYMMETRICAL COMPONENTS AND FAULT CALCULATIONS

Significance of positive, negative and zero sequence components, Average 3-phase power in terms of symmetrical components, sequence impedances and sequence networks, fault calculations, sequence network equations, single line to ground fault, line to line fault, double line to ground fault, three phase fault, faults on power systems, faults with fault impedance, reactors and their location, short circuit capacity of a bus.

TEXT BOOKS:

1. C.L. Wadhwa, "Electrical Power Systems", New Age International Pub. Co, Third Edition, 2001.
2. D.P. Kothari and I.J. Nagrath, "Modern Power System Analysis", Tata Mc Graw Hill Pub. Co.,New Delhi, Fourth edition, 2011.

REFERENCE BOOKS:

1. Chakrabarti, M.L. Soni, P.V. Gupta, U.S. Bhatnagar, "A Text book on Power SystemEngineering", Dhanpat Rai Publishing Company (P) Ltd, 2008.
2. John J. Grainger & W.D. Stevenson, "Power System Analysis", Mc Graw Hill International,1994.
3. Hadi Scadat, "Power System Analysis", Tata Mc Graw Hill Pub. Co. 2002.
4. W.D. Stevenson, "Elements of Power system Analysis", McGraw Hill International StudentEdition.

DIGITAL ELECTRONICS LAB

II B.Tech-II Semester **L T P C**
Course Code: A2EC409ES **0 0 2 1**

Prerequisites: Analog Electronics & Digital Electronics

COURSE OBJECTIVES:

1. To learn basic techniques for the design of digital circuits and number conversion systems.
2. To implement simple logical operations using combinational logic circuits.
3. To design combinational logic circuits, sequential logic circuits.

COURSE OUTCOMES:

After learning the contents of this paper the student must be able to

1. Understand the working of logic families and logic gates.
2. Design and implement Combinational and Sequential logic circuits.
3. Analyze different types of semiconductor memories.

LIST OF EXPERIMENTS:

1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. Generation of clock using NAND/NOR gates
4. Design a 4 – bit Adder / Subtractor
5. Design and realization a 4 – bit gray to Binary and Binary to Gray Converter
6. Design and realization of a 4-bit pseudo random sequence generator using logic gates.
7. Design and realization of an 8-bit parallel load and serial out shift register using flip-flops.
8. Design and realization Asynchronous and Synchronous counters using flip-flops
9. Design and realization 8x1 using 2x1 mux
10. Design and realization 2-bit comparator
11. Verification of truth tables and excitation tables
12. Realization of logic gates using DTL, TTL, ECL, etc.,

TEXT BOOKS:

1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

REFERENCE BOOKS:

1. R.S. Sedha, “A Textbook of Digital Electronics”, S.Chand, 2005
2. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

MEASUREMENT AND INSTRUMENTATION LAB

II B.Tech-II Semester **L T P C**
Course Code: A2EE404PC **0 0 2 1**

Prerequisites: Measurements and Instrumentation

COURSE OBJECTIVES:

1. To calibrate Watt, Energy and PF Meter and determination of three phase active & reactivepowers.
2. To determine unknown inductance, resistance, capacitance by performing experiments on D.C Bridges & A. C Bridges.
3. To determine the ratio and phase angle errors of Instrument transformers.

COURSE OUTCOMES:

After learning the contents of this paper the student must be able to

1. Choose and test any measuring instruments.
2. Find the accuracy of any instrument by performing experiments.
3. Calculate the various parameters using different types of measuring instruments.

The following experiments are required to be conducted as compulsory experiments:

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. Measurement of 3 - Phase reactive power with single-phase wattmeter.
8. Measurement of displacement with the help of LVDT.

In addition to the above eight experiments, at least any two of the experiments from the followinglist are required to be conducted:

1. Calibration LPF wattmeter – by Phantom testing.
2. Measurement of 3-phase power with single watt meter and two CTs.
3. C.T. testing using mutual Inductor – Measurement of % ratio error and phase angle of givenCT by Null method.
4. PT testing by comparison **–** V. G. as Null detector – Measurement of % ratio error and phaseangle of the given PT
5. Resistance strain gauge – strain measurements and Calibration.
6. Transformer turns ratio measurement using AC bridges.
7. Measurement of % ratio error and phase angle of given CT by comparison.

TEXT BOOKS:

1. K. Sawhney, "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co. Publications,2005.
2. Dr. Rajendra Prasad, "Electrical Measurements & Measuring Instruments", Khanna Publishers1989.

REFERENCE BOOKS:

1. G. K. Banerjee, "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2nd Edition,2016.
2. R. K. Rajput, "Electrical & Electronic Measurement & Instrumentation", S. Chand andCompany Ltd.,2007.
3. S. C. Bhargava, "Electrical Measuring Instruments and Measurements", BS Publications, 2012.
4. Buckingham and Price, "Electrical Measurements", Prentice – Hall, 1988.
5. Reissland, M. U, "Electrical Measurements: Fundamentals, Concepts, Applications", New Age International (P) Limited Publishers, 1st Edition 2010.
6. E.W. Golding and F. C. Widdis, "Electrical Measurements and measuring Instruments",fifth Edition,Wheeler Publishing, 2011.

ELECTRICAL MACHINES LAB – II

II B.Tech-II Semester **L T P C**
Course Code: A2EE405PC **0 0 2 1**

Prerequisites: Electrical Machines-I & Electrical Machines-II

COURSE OBJECTIVES:

1. To understand the operation of Induction, Synchronous machines and Transformers.
2. To study the performance analysis of Induction and Synchronous Machines through varioustesting methods.
3. To analyze the performance of single and 3-phase phase transformer with experiments.

COURSE OUTCOMES:

After learning the contents of this paper the student must be able to

1. Assess the performance of different types of AC machines using different testing methods.
2. Analyze the suitability of AC machines and Transformers for real word applications.
3. Design the machine models based on the application requirements.

THE FOLLOWING EXPERIMENTS ARE REQUIRED TO BE CONDUCTED AS COMPULSORY EXPERIMENTS:

1. Sumpner's test on a pair of single-phase transformers
2. No-load & Blocked rotor tests on three phase Induction motor
3. Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods
4. 'V' and 'Inverted V' curves of a three—phase synchronous motor.
5. Equivalent Circuit of a single-phase induction motor
6. Determination of Xd and Xq of a salient pole synchronous machine
7. Load test on three phase Induction Motor
8. Regulation of three-phase alternator by Z.P.F. and A.S.A methods

IN ADDITION TO THE ABOVE EXPERIMENTS, AT LEAST ANY TWO OF THE FOLLOWING EXPERIMENTS ARE REQUIRED TO BECONDUCTED FROM THE FOLLOWING LIST:

1. Separation of core losses of a single-phase transformer
2. Efficiency of a three-phase alternator
3. Parallel operation of Single-phase Transformers
4. Heat run test on a bank of 3 Nos. of single-phase Delta connected transformers
5. Measurement of sequence impedance of a three-phase alternator.
6. Vector grouping of Three Transformer
7. Scott Connection of transformer

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, "Electrical Machines", Oxford, 2017.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
4. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers,2004.

ENVIRONMENTAL STUDIES

II B.Tech-II Semester **L T P C**
Course Code: A2EE402MC **2 0 0 0**

COURSE OBJECTIVES:

1. Understanding the importance of ecological balance for sustainable development.
2. Acquire the knowledge of importance of natural resources & apply conservation techniques.
3. Analyzing the importance of Biodiversity.
4. Estimate the impacts of Environmental pollution, developmental activities and mitigation measures.
5. Evaluation of the environmental policies and regulations.

COURSE OUTCOMES:

1. Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles.
2. Able to apply the conservation methods of natural resources.
3. Able to analyze the conservation techniques of biodiversity.
4. Able to apply pollution control methods.
5. Able **to** understand and apply environmental regulations which in turn helps in sustainable development.

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.

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. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT III

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity: 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. 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. Concepts of bioremediation.

Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions /Protocols: Earth summit, Kyoto protocol, and Montréal Protocol.

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, biomedical waste management and handling rules, hazardous waste management and handling rules. Overview on Impacts of air, water, biological and Socio-economical 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,

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for UniversityGrants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.
3. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHLLearning Private Ltd. New Delhi.

REFERENCE BOOKS:

1. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI LearningPvt. Ltd.
2. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
3. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
4. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications
5. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.

III-YEAR (I-SEMESTER)

POWER ELECTRONICS

III B.Tech-I Semester **L T P C**
Course Code: A2EE501PC **3 1 0 4**

COURSE OBJECTIVES

Learn

1. To Design/develop suitable power converter for efficient control or conversion of power in drive applications
2. To Design / develop suitable power converter for efficient transmission and utilization of power in power system applications.

COURSE OUTCOMES

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

1. Understand the differences between signal level and power level devices.
2. Analyze controlled rectifier circuits.
3. Analyze the operation of DC-DC choppers.
4. Analyze the operation of voltage source inverters.

UNIT I POWER SWITCHING DEVICES

Concept of power electronics, scope and applications, types of power converters; Power semiconductor switches and their V-I characteristics - Power Diodes, Power BJT, SCR, Power MOSFET, Power IGBT; Thyristor ratings and protection, methods of SCR commutation, UJT as a trigger source, gate drive circuits for BJT and MOSFETs

UNIT II AC-DC CONVERTERS (PHASE CONTROLLED RECTIFIERS)

Principles of single-phase fully-controlled converter with R, RL, and RLE load, Principles of single-phase half-controlled converter with RL and RLE load, Principles of three-phase fully-controlled converter operation with RLE load, Effect of load and source inductances, General idea of gating circuits, Single phase and Three phase dual converters

UNIT III DC-DC CONVERTERS (CHOPPER/SMPS)

Introduction, elementary chopper with an active switch and diode, concepts of duty ratio, average inductor voltage, average capacitor current. Buck converter - Power circuit, analysis and wave forms at steady state, duty ratio control of output voltage. Boost converter - Power circuit, analysis and wave forms at steady state, relation between duty ratio and average output voltage. Buck-Boost converter - Power circuit, analysis and wave forms at steady state, relation between duty ratio and average output voltage.

UNIT IV DC-AC CONVERTERS (INVERTERS)

Introduction, principle of operation, performance parameters, single phase bridge inverters with R, RL loads, 3-phase bridge inverters - 120- and 180-degrees mode of operation, Voltage control of single-phase inverters–single pulse width modulation, multiple pulse width modulation, sinusoidal pulse width modulation.

UNIT V AC-AC CONVERTERS

Phase Controller (AC Voltage Regulator)-Introduction, principle of operation of single-phase voltage controllers for R, R-L loads and its applications. Cyclo-converter-Principle of operation of single phase cyclo-converters, relevant wave forms, circulating current mode of operation, Advantages and disadvantages.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

WEB REFERENCES:

1. https://www.freebookcentre.net/Electronics/Power-Electronics-Books.html
2. http://site.iugaza.edu.ps/malramlawi/files/RASHID_Power_Electronics_Handbook.pdf
3. https://nptel.ac.in/courses/108/102/108102145/

E-TEXT BOOK:

1. http://site.iugaza.edu.ps/malramlawi/files/RASHID_Power_Electronics_Handbook.pdf

MOOCS COURSE:

1. https://swayam.gov.in/
2. https://onlinecourses.nptel.ac.in/

CONTROL SYSTEMS

II B.Tech-I Semester **L T P C**
Course Code: A2EE502PC **3 1 0 4**

COURSE OBJECTIVES:

Learn

1. To understand the different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response
2. To assess the system performance using time domain analysis and methods for improving it.
3. To assess the system performance using frequency domain analysis and techniques for improving the performance
4. To design various controllers and compensators to improve system performance

COURSE OUTCOMES:

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

1. Understand the modelling of linear-time-invariant systems using transfer function and state- spacer presentations
2. Understand the concept of stability and its assessment for linear-time invariant systems
3. Design simple feedback controllers

UNIT I INTRODUCTION

Industrial Control examples. Mathematical models of physical systems. Control hardware and their models. Transfer function models of linear time-invariant systems. Feedback Control: Open-Loop and Closed-loop systems. Benefits of Feedback. Block diagram algebra.

UNIT II TIME RESPONSE ANALYSIS OF STANDARD TEST SIGNALS

Introduction, definitions of connected load, maximum demand, demand factor, load factor, diversity factor, Load duration curve, number and size of generator units. Base load and peak load plants. Cost of electrical energy-fixed cost, running cost, Tariff on charge to customer.

UNIT III FREQUENCY-RESPONSE ANALYSIS

Relationship between time and frequency response, Polar plots, Bode plots. Nyquist stability criterion. Relative stability using Nyquist criterion – gain and phase margin. Closed-loop frequency response**.**

UNIT IV CONTROLLER DESIGN

Stability, steady-state accuracy, transient accuracy, disturbance rejection, insensitivity and robustness of control systems. Root-loci method of feedback controller design. Design specifications in frequency-domain. Frequency-domain methods of design. Application of Proportional, Integral and Derivative Controllers, Lead and Lag compensation in designs. Analog and Digital implementation of controllers.

UNIT V STATE VARIABLE ANALYSIS AND CONCEPTS OF STATE VARIABLES

State space model. Diagonalization of State Matrix. Solution of state equations. Eigen values and Stability Analysis. Concept of controllability and observability. Pole-placement by state feedback. Discrete- time systems. Difference Equations. State-space models of linear discrete-time systems. Stability of linear discrete-time systems.

TEXT BOOKS:

1. M. Gopal, “Control Systems: Principles and Design”, McGraw Hill Education, 1997.
2. Kuo, “Automatic Control System”, Prentice Hall, 1995.

REFERENCE BOOKS:

1. K. Ogata, “Modern Control Engineering”, Prentice Hall, 1991.
2. J. Nagrath and M. Gopal, “Control Systems Engineering”, New Age International,2009

WEB REFERENCES:

1. https://www.sanfoundry.com/best-reference- books-control-systems/
2. https://www.tutorialspoint.com/control_systems/control_systems_introduction.htm

E-TEXT BOOKS:

1. https://easyengineering.net/control-systems-books/
2. https://www3.nd.edu/~pantsakl/Publications/348A-EEHandbook05.pdf
3. https://www.sanfoundry.com/best-reference-books-control-systems/

MOOCS COURSE:

1. https://onlinecourses.nptel.ac.in/noc19_de04/preview
2. https://www.mooc-list.com/tags/control-systems
3. https://www.mooc-list.com/tags/control-system

MICROPROCESSORS AND MICROCONTROLLERS

III B.Tech-I Semester **L T P C**
Course Code: A2EC502PC **3 0 0 3**

COURSE OBJECTIVES

Learn

1. To familiarize the architecture of microprocessors and microcontrollers
2. To provide the knowledge about interfacing techniques of bus &memory.
3. To understand the concepts of ARM architecture
4. To study the basic concepts of Advanced ARM processors

COURSE OUTCOMES

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

1. Understands the internal architecture, organization and assembly language programming of 8086 processors.
2. Understands the internal architecture, organization and assembly language programming of 8051/controllers
3. Understands the interfacing techniques to 8086 and 8051 based systems.
4. Understands the internal architecture of ARM processors and basic concepts of advanced ARM processors.

UNIT I 8086 ARCHITECTURE

8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086, interrupts of 8086.
Instruction Set and Assembly Language Programming of 8086: Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations

UNIT II INTRODUCTION TO MICROCONTROLLERS&8051 REAL TIME CONTROL:

Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.
8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters

UNIT III I/O AND MEMORY INTERFACE& SERIAL COMMUNICATION AND BUS INTERFACE:

I/O and Memory Interface: LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.
Serial Communication and Bus Interface: Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232, USB.

UNIT IV ARM ARCHITECTURE:

ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

UNIT V ADVANCED ARM PROCESSORS:

Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture.

TEXT BOOKS:

1. Advanced Microprocessors and Peripherals – A. K. Ray and K. M. Bhurchandani, TMH, 2nd Edition 2006.
2. ARM System Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012.

REFERENCE BOOKS:

1. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed, 2004.
2. Microprocessors and Interfacing, D. V. Hall, TMGH, 2nd Edition2006.
3. The 8051 Microcontrollers, Architecture and Programming and Applications -K. Uma Rao, Andhe Pallavi, Pearson, 2009.
4. Digital Signal Processing and Applications with the OMAP- L138 Experimenter, Donald Reay, WILEY2012.

WEB REFERENCES:

1. https://www.journals.elsevier.com/microprocessors-and-microsystems
2. https://www.microchip.com/en-us/products/microcontrollers-and-microprocessors
3. https://www.the8051microcontroller.com/web-references

E-TEXT BOOKS:

1. https://www.freebookcentre.net/Electronics/MicroProcessors-Books.html
2. https://books.google.co.in/books/about/MICROPROCESSORS_AND_MICROCONTROLLERS.html?id=viEaDAAAQBAJ&redir_esc=y

MOOCS COURSE:

1. https://books.google.co.in/books/about/MICROPROCESSORS_AND_MICROCONTROLLERS.html?id=viEaDAAAQBAJ&redir_esc=y

IOT APPLICATIONS IN ELECTRICAL ENGINEERING
(Professional Elective - I)

III B.Tech-I Semester **L T P C**
Course Code:A2EE501PE **3 0 0 3**

COURSE OBJECTIVES:
The objectives of the course are to:
1. understand the concepts of Internet of Things and able to build IoT applications
2. Learn the programming and use of Arduino and Raspberry Pi boards.
3. Known about data handling and analytics in SDN.

COURSE OUTCOMES:
Upon completing this course, the student will be able to
1. Known basic protocols in sensor networks.
2. Program and configure Arduino boards for various designs.
3. Python programming and interfacing for Raspberry Pi.
4. Design IoT applications in different domains.

UNIT I
Introduction to Internet of Things, Characteristics of IoT, Physical design of IoT, Functional blocks of IoT, Sensing, Actuation, Basics of Networking, Communication Protocols, Sensor Networks.

UNIT II
Machine-to-Machine Communications, Difference between IoT and M2M, Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino.

UNIT III
Machine-to-Machine Communications, Difference between IoT and M2M, Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino.

UNIT IV
Implementation of IoT with Raspberry Pi, Introduction to Software defined Network (SDN), SDN for IoT, Data Handling and Analytics.

UNIT V
Cloud Computing, Sensor-Cloud, Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Industrial IoT. Case Study: Agriculture, Healthcare, Activity Monitoring

TEXT BOOKS:
1. "The Internet 'of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
2. “Make sensors”: Terokarvinen, kemo, karvinen and villey valtokari, 1st edition, maker media, 2014.
3. "Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti

REFERENCE BOOKS:
1. Vijay Madisetti, Arshdeep Bahga, “Internet of Things: A Hands-On Approach”
2. Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"
3. Beginning Sensor networks with Arduino and Raspberry Pi – Charles Bell, Apress, 2013

MOOCS COURSE:

1. http://makautexam.net/aicte_details/MOOCS/EE.pdf
2. https://archive.nptel.ac.in/courses/108/108/108108123/

HIGH VOLTAGE ENGINEERING
(Professional Elective - I)

III B.Tech-I Semester **L T P C**

Course Code: A1EE502PE **3 0 0 3**

COURSE OBJECTIVES:

The course should enable the students:

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 andcurrent
3. To introduce High voltage testing methods

COURSE OUTCOMES:

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

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

UNIT I INTRODUCTION TO HIGH VOLTAGE TECHNOLOGY AND APPLICATIONS

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

UNIT II BREAK DOWN IN GASEOUS AND LIQUID DIELECTRICS

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

UNIT III GENERATION OF HIGH DIRECT CURRENT VOLTAGES

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

UNIT IV TESTING OF MATERIAL AND ELECTRICAL APPARATUS

Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements.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 Edition2009.
2. E. Kuffel, W. S. Zaengl, J. Kuffel, High Voltage Engineering: Fundamentals by Elsevier, 2nd Edition 2000.

REFERENCE BOOKS:

1. 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 Edition2000.

WEB REFERENCES:

1. https://www.mv.helsinki.fi/home/tpaulin/Text/hveng.pdfhttps://www.mv.helsinki.fi/home/tpaulin/Text/hveng.pdf
2. https://www.elsevier.com/books/high-voltage-engineering/hammond/978-0-08-024212-5

E TEXT BOOKS:

1. https://learnengineering.in/high-voltage-engineering-books/
2. https://www.mv.helsinki.fi/home/tpaulin/Text/hveng.pdf

MOOCS COURCE:

1. https://nptel.ac.in/courses/108/104/108104048/
2. https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering

COMPUTER AIDED ELECTRICAL MACHINE DESIGN
(Professional Elective - I)

III B.Tech-I Semester **L T P C**
Course Code: A2EE503PE **3 0 0 3**

COURSE OBJECTIVES:

To learn to know the major considerations in electrical machine design, electrical engineering materials, space factor, choice of specific electrical and magnetic loadings,

1. To analyze the thermal considerations, heat flow, temperature rise, rating of machines.
2. To understand the design of transformers
3. To study the design of induction motors
4. To know the design of synchronous machines
5. To understand the CAD design conceptss.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

1. Understand the construction and performance characteristics of electrical machines.
2. Understand the various factors which influence the design: electrical, magnetic and thermal loading of electrical machines
3. Understand the principles of electrical machine design and carry out a basic design of an ac machine.
4. Use software tools to do design calculations.

UNIT I INTRODUCTION

Major considerations in electrical machine design, electrical engineering materials, space factor, choice of specific electrical and magnetic loadings, thermal considerations, heat flow, temperature rise, rating of machines.

UNIT II TRANSFORMERS

Sizing of a transformer, main dimensions, kVA output for single- and three-phase transformers, window space factor, overall dimensions, operating characteristics, regulation, no load current, temperature rise in transformers, design of cooling tank, methods for cooling of transformers.

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UNIT III INDUCTION MOTORS

Sizing of an induction motor, main dimensions, length of air gap, rules for selecting rotor slots of squirrel cage machines, design of rotor bars & slots, design of end rings, design of wound rotor, magnetic leakage calculations, leakage reactance of poly-phase machines, magnetizing current, short circuit current, circle diagram, operating characteristics.

UNIT IV SYNCHRONOUS MACHINES

Sizing of a synchronous machine, main dimensions, design of salient pole machines, short circuit ratio, shape of pole face, armature design, armature parameters, estimation of airgap length, design of rotor, design of damper winding, determination of full load field mmf, design of field winding, design of turbo alternators, rotor design.

UNIT V COMPUTER AIDED DESIGN (CAD)

Limitations (assumptions) of traditional designs need for CAD analysis, synthesis and hybrid methods, design optimization methods, variables, constraints and objective function, problem formulation. Introduction to FEM based machine design. Introduction to **c**omplex structures of modern machines- PMSMs, BLDCs, SRM and claw-pole machines.

TEXT BOOKS:

1. K. Sawhney, “A Course in Electrical Machine Design”, Dhanpat Rai and Sons, 1970.
2. M.G. Say, “Theory & Performance & Design of A.C. Machines”, ELBS London.

REFERENCE BOOKS:

1. S. K. Sen, “Principles of Electrical Machine Design with computer programmes”, Oxford and IBH
2. Publishing, 2006.
3. K. L. Narang, “A Text Book of Electrical Engineering Drawings”, Satya Prakashan, 1969.
4. Shanmugasundaram, G. Gangadharan and R. Palani, “Electrical Machine Design Data Book”, New Age International, 1979.
5. M. V. Murthy, “Computer Aided Design of Electrical Machines”, B.S. Publications, 2008.
6. Electrical machines and equipment design exercise examples using Ansoft’s Maxwell 2D machine design package.

WEB REFERENCES:

1. https://www.slideshare.net/AsifJamadar/computer-aided-design-of-electrical-machine
2. https://www.academia.edu/40266764/Computer_Aided_Design_of_Electrical_Machines

E -TEXT BOOKS:

1. https://www.amazon.in/Computer-Aided-Design-Electrical-Machines/dp/B00KYR6VO8
2. https://www.amazon.in/Computer-Aided-Design-Electrical-Machines/dp/B00KYR6VO8

MOOCS COURSE:

1. https://www.academia.edu/40266764/Computer_Aided_Design_of_Electrical_Machines

BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

III B.Tech-I Semester **L T P C**
Course Code: A2MB503HS **3 0 0 3**

COURSE OBJECTIVES:

Learn

1. To learn the basic business types, impact of the economy on Business and Firms specifically. Tanalyze the Business from the Financial Perspective

COURSE OUTCOMES:

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

1. Understand the various Forms of Business and the impact of economic variable son the Business.
2. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt.
3. The Students can study the firm's financial position by analysing 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 and 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 Demanding decision making.

Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function and 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, Monopolistic Competition.

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

UNIT IV FINANCIAL ACCOUNTING

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

UNIT V FINANCIAL ANALYSIS THROUGH RATIOS

Concept of Ratio Analysis, Importance, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios – Analysis and Interpretation (simple problems).

TEXT BOOKS:

1. D. D. Chaturvedi, S. L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd.2013.
2. Dhanesh K Khatri, Financial Accounting, Tata Mc –Graw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata Mc Graw Hill Education Pvt. Ltd. 2012.

REFERENCE 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.

WEB REFERENCES:

1. https://www.investopedia.com/terms/f/financial-analysis.asp
2. http://pdfpremiumfree.com/download/managerial-economics-financial-analysis-aryasri-pdf/

MOOCS COURSE:

1. https://onlinecourses.nptel.ac.in/
2. https://www.edx.org/learn/financial-analysis
3. https://www.coursera.org/specializations/finance-quantitative-modeling-analysts
4. https://www.coursera.org/browse/business/finance

MICROPROCESSORS AND MICROCONTROLLERS LAB

III B.Tech-I Semester **L T P C**
Course Code: A2EC506ES **0 0 2 1**

LIST OF EXPERIMENTS

Experiment-1 Assembly Language Programs to 8086 to Perform:
Arithmetic, Logical, String Operations on 16 Bit and 32-BitData.
Experiment-2 Bit level Logical Operations, Rotate, Shift, Swap and Branch Operations.
Experiment-3 Introduction to IDE: Assembly Language Programs to Perform Arithmetic (Both Signed and Unsigned) 16 Bit Data Operations, Logical Operations (Byte and Bit Level Operations), Rotate, Shift, Swap and Branch Instructions
Experiment-4 Time delay Generation Using Timers of8051.
Experiment-5 Serial Communication from / to 8051 to / from I/O devices.
Experiment-6 Program Using Interrupts to Generate Square Wave 10 KHZ Frequency on P2.1 Using Timer08051in8bitAutoreloadModeandConnecta1HZPulsetoINT1pinandDisplay on Port 0. Assume Crystal Frequency as 11.0592MHZ
Experiment-7 7 Segment Display to8051.
Experiment-8 Matrix Keypad to8051.
Experiment-9 Sequence Generator Using Serial Interface in8051.
Experiment-10 8 bit ADC Interface to8051.
Experiment-11 Triangular Wave Generator through DAC interfaces to8051.

TEXT BOOKS:

1. Advanced Microprocessors and Peripherals by A K Ray, Tata McGraw-Hill Education,2006
2. The 8051 *Microcontrollers*: Architecture, Programming & Applications by Dr. K. Uma Rao, Andhe Pallavi, Pearson, 2009.

REFERENCE BOOKS:

1. https://slideplayer.com/slide/7936231/
2. https://www.sanfoundry.com/best-reference-books-microprocessors/

POWER ELECTRONICS LAB

III B.Tech-I Semester **L T P C**
Course Code: A2EE503PC **0 0 2 1**

COURSE OBJECTIVES:

The course should enable the students to:

1. Apply the concepts of power electronic converters for efficient conversion/control of power from source to load.
2. Design the power converter with suitable switches meeting a specific load requirement.

COURSE OUTCOMES:

By the end of the course students will be able:

1. Understand the operating principles of various power electronic converters.
2. Use power electronic simulation packages& hardware to develop the power converters.
3. Analyze and choose the appropriate converters for various applications

LIST OF EXPERIMENTS

Experiment-1 Study of Characteristics of SCR, MOSFET &IGBT.
Experiment-2 Gate firing circuits for SCR's
Experiment-3 Single Phase AC Voltage Controller with R and RL Loads
Experiment-4 Single Phase half controlled &fully controlled bridge converter with R and RL loads
Experiment-5 Forced Commutation circuits (Class A, Class B, Class C, Class D &Class E)
Experiment-6 Single Phase Cyclo-converter with R and RL loads
Experiment-7 Single Phase series& parallel inverter with R and RL loads
Experiment-8 Single Phase Bridge inverter with R and RL loads
Experiment-9 DC Jones chopper with R and RL Loads
Experiment-10 Three Phase half-controlled bridge converter with R-load
Experiment-11 Single Phase dual converter with RL loads
Experiment-12 Simulation of single-phase Inverter with PWM control

REFERENCE BOOKS:

1. M. H. Rashid, Simulation of Electric and Electronic circuits using PSPICE – by M/s PHI Publications
2. User's manual of related software's
3. Rashid, Spice for power electronics and electric power, CRC Press

WEB REFERENCES:

1. https://onlinelibrary.wiley.com/doi/abs/10.1002/cae.21673
2. https://ceme.ece.illinois.edu/files/2014/07/ECE469V25.pdf
3. https://web.ecs.baylor.edu/faculty/grady/Grady_UT_Austin_EE462L_Fall_2010.pdf

ADVANCED ENGLISH COMMUNICATION SKILLS LAB

III B. Tech-I Semester **L T P C**
Course Code: A2EN505HS **0 0 2 1**

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context. The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

COURSE OBJECTIVES:

1. To provide students with a wide range of vocabulary to enable them to take language tests for higher education and employment
2. To assist students acquire effective and adequate presentation skills
3. To improve communication skills of students by making them participate in different language activities
4. To prepare students for facing interviews self-assuredly.
5. To help students to develop an awareness in studies about the significance of silent reading and comprehension.

COURSE OUTCOMES:

1. State meanings, synonyms, antonyms, analogies, idioms, phrases, one-word substitutes, word roots, prefixes and suffixes for words in general.
2. Present and interpret data on select topics using pre-existing slides.
3. Collect data extensively on a social issue and make it public for the sake of enlightening populace.
4. Contribute proactively and extrapolate in group discussions.
5. Make impromptu speeches.

LIST OF EXPERIMENTS

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary -** Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

2. **Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.

3. **Activities on Writing Skills** – Structure and presentation of different types of writing – letter writing/Resume writing/ e-correspondence/Technical report writing/ – planning for writing – improving one's writing.

4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/ emails/assignments etc.

5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

TEXT BOOKS:

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2 nd Edition
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

REFERENCE BOOKS:

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008. 6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
6. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
7. Job Hunting by Colm Downes, Cambridge University Press 2008.
8. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.

INTELLECTUAL PROPERTY RIGHTS

II B.Tech-II Semester **L T P C**
Course Code: A2EE503MC **2 0 0 0**

UNIT I
Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT II
Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT III
Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT IV
Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation. Unfair competition: Misappropriation right of publicity, false advertising.

UNIT V
New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT & REFERENCE BOOKS:
1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata
3. McGraw Hill Publishing company ltd.

III-YEAR (II-SEMESTER)

RENEWABLE ENERGY SOURCES
(Open Elective – I)

III B.Tech-II Semester **L T P C**

Course Code: A2EE601OE **3 0 0 3**

COURSE OBJECTIVES:

1. To recognize the awareness of energy conservation in students
2. To identify the use of renewable energy sources for electrical power generation
3. To collect different energy storage methods
4. To detect about environmental effects of energy conversion

COURSE OUTCOMES:

1. Understand the principles of wind power and solar photovoltaic power generation, fuel cells.
2. Assess the cost of generation for conventional and renewable energy plants
3. Design suitable power controller for wind and solar applications
4. Analyze the issues involved in the integration of renewable energy sources to the grid

UNIT – I INTRODUCTION- WIND POWER PLANTS

Renewable Sources of Energy-Grid-Supplied Electricity-Distributed Generation-Renewable Energy Economics-Calculation of Electricity Generation Costs –Demand side Management Options –Supply side Management Options-Modern Electronic Controls of Power Systems.

Wind Power Plants: Appropriate Location -Evaluation of Wind Intensity -Topography -Purpose of the Energy Generated - GeneralClassificationofWindTurbines-RotorTurbines-Multiple-BladeTurbinesDragTurbines-Lifting Turbines-Generators and Speed Control used in Wind Power Energy Analysis of Small Generating Systems.

UNIT – II PHOTOVOLTAIC POWER PLANTS

Solar Energy-Generation of Electricity by Photovoltaic Effect -Dependence of a PV Cell Characteristic on Temperature-Solar cell Output Characteristics-Equivalent Models and Parameters for Photovoltaic Panels-Photovoltaic Systems-Applications of Photovoltaic Solar Energy-Economical Analysis of Solar Energy.

FuelCells:TheFuelCell-LowandHighTemperatureFuelCells-CommercialandManufacturingIssues Constructional Features of Proton Exchange-Membrane Fuel Cells –Reformers-Electrolyze Systems and Related Precautions-Advantages and Disadvantages of Fuel Cells-Fuel Cell Equivalent Circuit- Practical Determination of the Equivalent Model Parameters -Aspects of Hydrogen as Fuel.

UNIT – III INDUCTION GENERATORS

Principles of Operation-Representation of Steady-State Operation-Power and Losses Generated-Self- Excited Induction Generator-Magnetizing Curves and Self-Excitation Mathematical Description of the Self-Excitation Process-Interconnected and Stand-alone operation -Speed and Voltage Control - Economical Aspects.

UNIT – IV STORAGE SYSTEMS

Energy Storage Parameters-Lead–Acid Batteries-Ultra Capacitors-Flywheels –Superconducting Magnetic Storage System-Pumped Hydroelectric Energy Storage - Compressed Air Energy Storage - Storage Heat -Energy Storage as an Economic Resource

UNIT – V INTEGRATION OF ALTERNATIVE SOURCES OF ENERGY

Principles of Power Injection-Instantaneous Active and Reactive Power Control Approach Integration of Multiple Renewable Energy Sources-Islanding and Interconnection Control-DG Control and Power Injection. Interconnection of Alternative Energy Sources with the Grid:

Interconnection Technologies - Standards and Codes for Interconnection - Interconnection Considerations - Interconnection Examples for Alternative Energy Sources.

TEXT BOOKS:

1. Felix A. Farret, M. Godoy Simoes, “Integration of Alternative Sources of Energy”, John Wiley& Sons,2006.
2. Solanki: Renewable Energy Technologies: Practical Guide for Beginners, PHI Learning Pvt. Ltd.,2008.

REFERENCE BOOKS:

1. D. Mukherjee: Fundamentals of Renewable Energy Systems, New Age International publishers,2007.
2. Remus Teodorescu, Marco Liserre, Pedro Rodríguez: Grid Converters for Photovoltaic and Wind Power Systems, John Wiley & Sons,2011.
3. GilbertM.Masters: Renewable and Efficient Electric PowerSystems,JohnWiley&Sons,2004.

WEB REFERENCES:

1. https://www.eia.gov/energyexplained/renewable-sources/
2. https://www.tandfonline.com/doi/full/10.1080/23311916.2016.1167990
3. https://www.journals.elsevier.com/renewable-energy

E-TEXT BOOKS:

1. https://www.vssut.ac.in/lecture_notes/lecture1428910296.pdf
2. https://www.amazon.in/Renewable-Energy-Sources-Professional-Publications/dp/B00PUAROWW

MOOCS COURSES:

1. https://www.coursera.org/courses?query=renewable%20energy
2. https://online-learning.tudelft.nl/courses/sustainable-energy-design-a-renewable-future/

FUNDAMENTAL OF ELECTRIC VEHICLES
(Open Elective – I)

III B.Tech-II Semester **L T P C**
Course Code: A2EE602OE **3 0 0 3**

COURSE OBJECTIVES:

1. To understand the fundamental concepts, principles, analysis and design of hybrid and electric vehicles.
2. To know the various aspects of hybrid and electric drive train such as their configuration, typesof electric machines that can be used energy storage devices, etc.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

1. Understand the models to describe hybrid vehicles and their performance.
2. Understand the different possible ways of energy storage.
3. Understand the different strategies related to energy storage systems.

UNIT I INTRODUCTION AND GENERAL OVERVIEW:

Transportation industry's salient characteristics; key drivers of transportation electrification; historical synopsis of EVs in transportation sectors; energy and environmental issues; global EV deployment and e-mobility; course scope and objectives

UNIT II KEY CONSIDERATIONS IN EV DESIGN AND OPERATIONS:

EV size and weight; range implications; vehicle parameters and performance metrics, their nature and typical values for various vehicle types; definition and role of drive cycles in performance assessment; performance evaluation

UNIT III EV ARCHITECTURES AND CONFIGURATIONS:

the major EV subsystems – motors, drives, inverters, batteries and energy storage, chargers, sensors and controls; architectural structures and configurations; generator sets and hybrid subsystems

UNIT IV EV BATTERIES AND THEIR MANAGEMENT:

key portable energy requirements beyond rechargeability; key battery components, their roles and characteristics; electrochemical cell as the building block of battery packs – from cells to modules to packs; battery operations phases – charging, discharging and idle; battery features; major figures of merit – capacity, storage capability, efficiency, health, life, energy density, specific power, state of charge (s.o.c.), depth of discharge, voltage/current characterization, temperature and geometry; today's dominance of Li-ion batteries and their limitations

UNIT V

Basic Principles of, and Design Considerations in, EV Electric Motors and Generators: concepts of electromechanical energy conversion – energy, co-energy, force and torque; review of low-frequency electromagnetics (EM) and EM force calculations of shear stress, machine power density and efficiency; generator application requirements on torque–speed curve, constant power speed range; comparative assessment and equivalent circuits of motor types – induction, surface and internal permanent magnet, switched and synchronous reluctance

TEXT BOOKS:

1. C. Mi, M. A. Masrur and D. W. Gao, "Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives", John Wiley & Sons, 2011.
2. S. Onori, L. Serrao and G. Rizzoni, "Hybrid Electric Vehicles: Energy Management Strategies", Springer, 2015.

REFERENCE BOOKS:

1. M. Ehsani, Y. Gao, S. E. Gay and A. Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design", CRC Press, 2004.
2. T. Denton, "Electric and Hybrid Vehicles", Routledge, 2016.

WEB REFERENCES:

1. https://en.wikipedia.org/wiki/Electric_vehicle
2. https://studyelectrical.com/course/fundamentals-of-electric-vehicles-technology-economics

E-TEXT BOOKS:

1. https://www.routledge.com/rsc/downloads/CRC_Hybrid_Vehicles_Freebook.pdf
2. https://afdc.energy.gov/vehicles/electric.html

MOOCS COURSES:

1. https://onlinecourses.nptel.ac.in/noc20_ee99/preview

CYBER –PHYSICAL SYSTEMS
(Professional Elective –II)

III B.Tech-II Semester **L T P C**
Course Code:A2EE604PE **3 0 0 3**

COURSE OBJECTIVES:
To make the students understand the types of roles they are expected to play in the societyas practitioners of the civil engineering profession
1. To develop some ideas of the legal and practical aspects of their profession.

COURSE OUTCOMES:
1. The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers.
2. The students will learn the rights and responsibilities as an employee, team member and a global citizen

UNIT I
The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers.
The students will learn the rights and responsibilities as an employee, team member and a global citizen

UNIT II
Secure System Planning and administration, Introduction to the orange book, Security policy requirements, accountability, assurance and documentation requirements, Network Security, The Red book and Government network evaluations.

UNIT III
Information security policies and procedures: Corporate policies- Tier 1, Tier 2 and Tier3 policies - process management-planning and preparation-developing policies-asset classification policy developing standards.

UNIT IV
Information security: fundamentals-Employee responsibilities- information classification- Information handling-Tools of information security- Information processing-secure program administration.

UNIT V
Organizational and Human Security: Adoption of Information Security Management Standards, Human Factors in Security- Role of information security professionals.

TEXT BOOKS:
1. Debby Russell and Sr. G. T Gangemi, "Computer Security Basics (Paperback)", 2nd Edition, O' Reilly Media, 2006.
2. Thomas R. Peltier, "Information Security policies and procedures: A Practitioner's Reference", 2nd Edition Prentice Hall, 2004.

REFERENCE BOOKS:
1. Kenneth J. Knapp, "Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions", IGI Global, 2009.
2. Thomas R Peltier, Justin Peltier and John blackley," Information Security Fundamentals", 2nd Edition, Prentice Hall, 1996
3. Jonathan Rosenoer, "Cyber law: the Law of the Internet", Springer-verlag, 1997
4. James Graham, "Cyber Security Essentials" Averbach Publication T & F Group.

MOOCS COURSE:
1. https://www.mooc-list.com/tags/cyber-physical-systems

POWER SEMICONDUCTOR DRIVES
(Professional Elective –II)

III B.Tech-II Semester **L T P C**
Course Code: A2EE605PE **3 0 0 3**

COURSE OBJECTIVES

To prepare the students to
1. Improve power semiconductor device structures for adjustable speed motor control applications.
2. Understand the static and dynamic characteristics of current controlled power semiconductor devices
3. Understand the static and dynamic characteristics of voltage controlled power semiconductor devices
4. Enable the students for the selection of devices for different power electronics applications
5. Understand the control and firing circuit for different devices.

COURSE OUTCOMES

Upon completion of this course, students should be able to:
1. Know the operating charactertics of various basic semiconductor devices and switches
2. Understand the advanced power semiconductor devices operation.
3. Know the modeling of basic and advanced semiconductor devices and switches through simulation
4. Analyze the applications of various power semiconductor switches

UNIT I POWER DIODES

Basic structure and V-I characteristics, breakdown voltages and control, on-state losses, switching characteristics- turn-on transient, turn off transient and reverse recovery transient, Schottky diodes, snubber requirements for diodes, diode snubber, modeling and simulation of Power diodes. 5 Hrs. Power BJT'S: Basic structure and V-I characteristics, breakdown voltages and control, secondary breakdown and it's control- FBSOA and RBSOA curves - on state losses, switching characteristics, resistive switching specifications, clamped inductive switching specifications, turn-on transient, turn-off transient, storage time, base drive requirements, switching losses

UNIT II POWER BJT'S, SCR, TRIACS

Device protection- snubber requirements for BJT'S and snubber design switching aids, modeling and simulation of power BJT'S Basic structure, V-I characteristics, turn-on process, on-state operation, turn -off process, switching characteristics, turn-on transient and di/dt limitations, turn-off transient, turnoff time and reapplied dv/dt limitations, gate drive requirements, ratings of thyristors, snubber requirements and snubber design, modelling and simulation of thyristor Basic structure and operation-I characteristics, ratings, snubber requirements, modeling and simulation of triacs.

UNIT III GATE TURNOFF THYRISTOR & POWER MOSFET

Basic structure and operation, GTO switching characteristics, TO turn-on transient, GTO turn -off transient, minimum on and off state times, gate drive requirements, maximum controllable anode current, over current protection of GTO'S, modeling and simulation of GTO'S.

Basic structure, V-I characteristics, turn-on process, on state operation, turnoff process, switching Characteristics, resistive switching specifications, clamped inductive switching specifications - turn-on transient and di/dt limitations, turn-off transient, turn off time, switching losses, effect of reverse recovery transients on switching stresses and losses - dv/dt limitations, gating requirements, gate charge - ratings of MOSFET'S, FBSOA and RBSOA curves, device protection - snubber requirements, modeling and simulation of Power MOSFET'S.

UNIT IV INSULATED GATE BIPOLAR TRANSISTORS (IGBT'S)

Basic structure and operation, latch up IGBT, switching characteristics, resistive switching specifications, clamped inductive switching specification –IGBT turn-on transient, IGBT turn off transient- current tailing - gating requirements ,ratings of IGBT'S,FBSOA and RBSOA curves, switching losses – minimum on and off state times, switching frequency capability – overcurrent protection of IGBT'S, short circuit protection, snubber requirements and snubber design.

UNIT V ADVANCED POWER SEMICONDUCTOR DEVICES

MOS gated thyristors, MOS controlled thyristors or MOS GTO'S, base resistance controlled thyristors, emitter switched thyristor, thermal design of power electronic equipment, modelling and simulation, heat transfer by conduction, transient thermal impedance, heat sinks, heat transfer by radiation and convection - heat sinks election for power semiconductor devices.

TEXT BOOKS:

1. Ned Mohan, Tore M. Undeland, William P. Robbins, "Power Electronics Converters, Applications, and Design", 3rd Edition. Wiley India Pvt Ltd, 2011.
2. G. Massobrio, P. Antognetti, "Semiconductor Device Modeling with Spice", McGrawHill, 2nd Edition, 2010.

REFERENCE BOOKS:

1. Ned Mohan, Tore M. Undeland, William P. Robbins, "Power Electronics Converters, Applications, and Design", 3rd Edition. Wiley India Pvt Ltd, 2011.
2. G. Massobrio, P. Antognetti, "Semiconductor Device Modeling with Spice", McGrawHill, 2nd Edition, 2010.

WEB REFERENCES:

1. http://www.cluster2.hostgator.co.in/files/writeable/uploads/hostgator58966/file/powerelectronicssemoconductordevices.pdf
2. http://www.ime.cas.cn/icac/learning/learning_3/201907/P020190717354934353602.pdf
3. https://onlinelibrary.wiley.com/doi/pdf/10.1002/9780470611494.fmatter

E -TEXT BOOKS:

1. https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1043&context=elecengtheses

MOOCS COURSE:

1. https://www.coursera.org/lecture/converter-circuits/sect-4-2-0-introduction-to-power-semiconductors-b5VYY
2. https://www.coursera.org/specializations/power-electronics
3. https://nptel.ac.in/courses/108/102/108102145/
4. https://online.stanford.edu/courses/ee216-principles-and-models-semiconductor-devices

WIND AND SOLAR ENERGY SYSTEMS
(Professional Elective –II)

III B.Tech-II Semester **L T P C**

Course Code: A2EE606PE **3 0 0 3**

COUESE OBJECTIVE:

1. This course envisages the new and renewable source of energy, available in nature and to expose the students on sources of energy crisis and the alternates available, also stress up on the application of non-conventional energy technologies.

COURSE OUTCOMES

1. Understand the need of energy conversion and the various methods of energy storage
2. Explain the field applications of solar energy
3. Identify Winds energy as alternate form of energy and to know how it can be tapped
4. Explain bio gas generation and its impact on environment
5. Understand the Geothermal &Tidal energy, its mechanism of production and its applications Illustrate the concepts of Direct Energy Conversion systems & their applications

UNIT I PRINCIPLES OF SOLAR RADIATION

Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT II SOLAR ENERGY COLLECTION

Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.Direct Energy Conversion: Need for DEC, Carnot cycle, limitations, principles of DEC. Thermoelectric generators, seebeck, peltier and joul Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects.Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

UNIT III SOLAR ENERGY STORAGE AND APPLICATIONS

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

Ocean Energy: OTEC,Principlesutilization,settingofOTECplants,thermodynamiccycles.Tidaland wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT IV WIND ENERGY

Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.

UNIT V BIO-MASS

Principles of Bio Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

TEXT BOOKS:

1. Non-Conventional Energy Sources /G.D.Rai
2. Renewable Energy Technologies /Ramesh &Kumar/Narosa

REFERENCE BOOKS:

1. Renewable energy resources/ Tiwari andGhosal/Narosa.
2. Non-Conventional Energy / Ashok V Desai /WileyEastern.
3. Non-Conventional Energy Systems / KMittal/Wheeler
4. Solar Energy/Sukhame

WEB REFERENCES:

1. https://www.routledge.com/Wind-and-Solar-Power-Systems-Design-Analysis-and-Operation/Patel-Beik/p/book/9780367476939
2. https://library.uniteddiversity.coop/Energy/Wind/Wind_and_Solar_Power_Systems.pdf
3. https://www.nap.edu/read/11935/chapter/8

E-TEXT BOOKS:

1. https://www.amazon.in/Wind-Solar-Power-Systems-Operation/dp/0849315700
2. https://www.amazon.in/Renewable-Energy-Systems-David-Buchla/dp/9332586829

MOOCS COURSES:

1. https://www.mooc-list.com/tags/wind-energy
2. https://www.mooc-list.com/tags/solar-energy
3. https://platform.europeanmoocs.eu/course_renewable_energy_technologies

DIGITAL SIGNAL PROCESSING

III B.Tech-II Semester **L T P C**
Course Code: A2EC601ES **3 0 0 3**

COURSE OBJECTIVES:

The course should enable the students:

1. To provide background and fundamental material for the analysis and processing of digital signals.
2. To familiarize the relationships between continuous-time and discrete time signals and systems.
3. To study fundamentals of time, frequency and Z-plane analysis and to discuss the inter-relationships of these analytic method.

COURSE OUTCOMES:

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

1. Perform time, frequency, and Z -transform analysis on signals andsystems.
2. Understand the inter-relationship between DFT and varioustransforms.
3. Understand the significance of various filter structures and effects of round offerrors.
4. Design a digital filter for a givenspecification.
5. Understand the fast computation of DFT and appreciate the FFTprocessing.
6. Understand the trade-offs between normal and multi rate DSP techniques and finite length wordeffects.

UNIT I INTRODUCTION, REALIZATION OF DIGITAL FILTERS

Introduction to Digital Signal Processing: Discrete Time Signals & Sequences, conversion of continuous to discrete signal, Linear Shift Invariant Systems, Stability, and Causality, linear differential equation to difference equation, Linear Constant Coefficient Difference Equations, Frequency Domain Representation of Discrete Time Signals and Systems

Applications of Z – Transforms, Solution of Difference Equations of Digital Filters, System Function, Stability Criterion, Frequency Response of Stable Systems, Realization of Digital Filters – Direct, Canonic, Cascade and Parallel.

UNIT II DISCRETE FOURIER TRANSFORMS, FAST FOURIER TRANSFORMS

Properties of DFT, Linear Convolution of Sequences using DFT, Computation of DFT: Over-Lap Add Method, Over-Lap Save Method, Relation between DTFT, DFS, DFT and Z-Transform

Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT, and FFT with GeneralRadix-N.

UNIT III IIR DIGITAL FILTERS

Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital Filters from Analog Filters, Step and Impulse Invariant Techniques, Bilinear Transformation Method, Spectral Transformations.

UNIT IV FIR DIGITAL FILTERS

Characteristics of FIR Digital Filters, Frequency Response, Design of FIR Filters: Fourier Method, Digital Filters using Window Techniques, Frequency Sampling Technique, Comparison of IIR & FIR filters.

UNIT V MULTI RATE DIGITAL SIGNAL PROCESSING

Introduction, Down Sampling, Decimation, Up sampling, Interpolation, Sampling Rate Conversion, Conversion of Band Pass Signals, Concept of Resampling, Applications of Multi Rate Signal Processing.

Limit cycles, Overflow Oscillations, Round-off Noise in IIR Digital Filters, Computational Output Round off Noise, Methods to Prevent Overflow, Tradeoff between Round Off and Overflow Noise, Measurement of Coefficient Quantization Effects through Pole-Zero Movement, Dead Band Effects.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI,2007.
2. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI,2009

REFERENCE BOOKS:

1. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier,2008
2. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling, Sandra L. Harris, Thomson,2007
3. Digital Signal Processing - A Practical approach, Emmanuel C. Ifeachor andBarrie
4. W. Jervis, 2nd Edition, Pearson Education, 2009

WEB REFERENCES:

1. https://www.journals.elsevier.com/digital-signal-processing
2. https://www.elsevier.com/journals/digital-signal-processing/1051-2004?generatepdf=true
3. https://www.informit.com/articles/article.aspx?p=1650107&seqNum=9

E TEXT BOOKS:

1. https://users.dimi.uniud.it/~antonio.dangelo/MMS/materials/Guide_to_Digital_Signal_Process.pdf
2. http://fmipa.umri.ac.id/wp-content/uploads/2016/03/Andreas-Intoniou-Digital-signal-processing.9780071454247.31527.pdf

MOOCS COURSE:

1. https://www.classcentral.com/course/dsp-423
2. https://www.coursera.org/learn/dsp1

POWER SYSTEM PROTECTION

III B.Tech-I Semester **L T P C**
Course Code: A2EE601PC **3 0 0 3**

COURSE OBJECTIVES

Learn

1. To analyze the performance of transmission lines.
2. To understand the voltage control and compensation methods.
3. To understand the per unit representation of power systems.
4. To examine the performance of travelling waves.
5. ToknowthemethodsofovervoltageprotectionandInsulationcoordinationoftransmissionlines

COURSE OUTCOMES

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

1. Analyze transmission line performance.
2. Apply load compensation techniques to control reactive power
3. Understand the application of per unit quantities.
4. Design over voltage protection and insulation coordination
5. Determine the fault currents for symmetrical and unbalanced faults

UNIT I PERFORMANCE OF LINES

Representation of lines, short transmission lines, medium length lines, nominal T and PI- representations, long transmission lines. The equivalent circuit representation of a long Line, A, B, C, D constants, Ferranti Effect, Power flow through a transmission line, receiving end power circle diagram.

UNIT II VOLTAGE CONTROL & COMPENSATION IN POWER SYSTEMS

Voltage Control

Introduction – methods of voltage control, shunt and series capacitors / Inductors, tap changing transformers, synchronous phase modifiers.

Compensation in Power Systems

Introduction - Concepts of Load compensation – Load ability characteristics of overhead lines – Uncompensated transmission line – Symmetrical line – Radial line with asynchronous load – Compensation of lines.

UNIT III PER UNIT REPRESENTATION

Per Unit Representation of Power Systems:

The one-line diagram, impedance and reactance diagrams, per unit quantities, changing the base of per unit quantities, advantages of per unit system.

Travelling Waves on Transmission Lines:

Production of travelling waves, open circuited line, short circuited line, line terminated through a resistance, line connected to a cable, reflection and refraction at T-junction line terminated through a capacitance, capacitor connection at a T-junction, Attenuation of travelling waves.

UNIT IV OVER VOLTAGE PROTECTION AND INSULATION COORDINATION

Over voltage due to arcing ground and Peterson coil, lightning, horn gaps, surge diverters, rod gaps, expulsion type lightning arrester, valve type lightning arrester, ground wires, ground rods, counterpoise, surge absorbers, insulation coordination, volt-time curves.

UNIT V SYMMETRICAL COMPONENTS AND FAULT CALCULATIONS

Significance of positive, negative and zero sequence components, Average 3-phase power in terms of symmetrical components, sequence impedances and sequence networks, fault calculations, sequence network equations, single line to ground fault, line to line fault, double line to ground fault, three phase faults, faults on power systems, faults with fault impedance, reactors and their location, short circuit capacity of a bus.

TEXTBOOKS:

1. John J. Grainger & W.D. Stevenson: Power System Analysis – Mc Graw Hill International1994.
2. C.L. Wadhwa: Electrical Power Systems – New Age International Pub. Co. Third Edition, 2001.

REFERENCE BOOKS:

1. Hadi Scadat: Power System Analysis – Tata Mc Graw Hill Pub. Co.2002
2. W.D. Stevenson: Elements of Power system Analysis – McGraw Hill International Student Edition.
3. D.P. Kothari and I. J. Nagrath, Modern Power System Analysis - Tata Mc Graw Hill Pub. Co., New Delhi, Fourth edition,2011

WEB REFERENCES:

1. https://www.darshan.ac.in/DIET/EE/SubjectDetail/2160908
2. https://onlinelibrary.wiley.com/doi/book/10.1002/0471722901

E-TEXT BOOK:

1. https://www.studynama.com/community/threads/power-systems-2-quick-revision-pdf-notes-book-ebook-for-electrical-engineering-free-download.347/

MOOCS COURSE:

1. https://nptel.ac.in/courses/108/105/108105067/

POWER SYSTEM OPERATION AND CONTROL

III B.Tech-II Semester **L T P C**
Course Code: A2EE602PC **3 0 0 3**

COURSE OBJECTIVES

1. Learn
2. To understand real power control and operation
3. To know the importance of frequency control
4. To analyze different methods to control reactive power
5. To understand unit commitment problem and importance of economic load dispatch
6. To understand real time control of power systems

COURSE OUTCOMES

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

1. Understand operation and control of power systems.
2. Analyze various functions of Energy Management System (EMS) functions.
3. Analyze whether the machine is in stable or unstable position.
4. Understand power system deregulation and restructuring

UNIT I LOAD FLOW STUDIES

Introduction, Bus classification -Nodal admittance matrix - Load flow equations - Iterative methods - Gauss and Gauss Seidel Methods, Newton-Raphson Method-Fast Decoupled method-Merits and demerits of the above methods-System data for load flow study

UNIT II ECONOMIC OPERATION OF POWER SYSTEMS

Distribution of load between units within a plant-Transmission loss as a function of plant generation, Calculation of loss coefficients-Distribution of load between plants.

UNIT III LOAD FREQUENCY CONTROL

Introduction, load frequency problem-Megawatt frequency (or P-f) control channel, MVAR voltages (or Q-V) control channel-Dynamic interaction between P-f and Q-V loops. Mathematical model of speed- governing system-Turbine models, division of power system into control areas, P-f control of single control area (the uncontrolled and controlled cases)-P-f control of two area systems (the uncontrolled cases and controlled cases)

UNIT IV POWER SYSTEM STABILITY

The stability problem-Steady state stability, transient stability and Dynamic stability-Swing equation. Equal area criterion of stability-Applications of Equal area criterion, Step by step solution of swing equation-Factors affecting transient stability, Methods to improve steady state and Transient stability, Introduction to voltage stability

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 – SCADAandEMSfunctions.Networktopology–ImportanceofLoadForecastingandsimpletechniques of forecasting.

TEXT BOOKS:

1. C.L.Wadhwa, Electrical Power Systems, 3rd Edn, New Age International Publishing Co.,2001.
2. D. P. Kothari and I. J. Nagrath, Modern Power System Analysis, 4th Edn, Tata McGraw Hill Education Private Limited2011.

REFERENCE BOOKS:

1. D. P. Kothari: Modern Power System Analysis-Tata Mc Graw Hill Pub. Co.2003.
2. Hadi Sadat: Power System Analysis –Tata Mc Graw Hill Pub. Co.2002.

WEB REFERENCES:

1. https://www.sciencedirect.com/topics/engineering/power-system-control
2. https://www.researchgate.net/publication/321488759_Power_System_Operation_Control_and_Restructuring
3. https://www.darshan.ac.in/DIET/EE/SubjectDetail/2180909

E -TEXT BOOKS:

1. https://www.engbookspdf.com/download/Power-System/Power-System-Operation-and-Control
2. https://easyengineering.net/operation-and-control-in-power-systems-by-murty/

MOOCS COURSE:

1. https://nptel.ac.in/courses/108/101/108101040/

POWER SYSTEMS LAB

III B.Tech-II Semester **L T P C**
Course Code: A2EE603PC **0 0 2 1**

COURSE OBJECTIVES:

1. The testing of CT, PT's and Insulator strings
2. To find sequence impedances of 3-Φ synchronous machine and Transformer
3. To perform fault analysis on Transmission line models and Generators.

COURSE OUTCOMES:

1. Perform various load flow techniques
2. Understand Different protection methods
3. Analyze the experimental data and draw the conclusions.

LIST OF EXPERIMENTS

Group A

Experiment-1 Characteristics of IDMT Over-Current Relay.
Experiment-2 Differential protection of 1-Φ transformer.
Experiment-3 Characteristics of Micro Processor based Over Voltage/Under Voltage relay.
Experiment-4 A,B,C,D constants of a Long Transmission line
Experiment-5 Finding the sequence impedances of 3-Φ synchronous machine.
Experiment-6 Finding the sequence impedances of 3-Φ Transformer

Note:In addition to the above six experiments, at least any four of the experiments from the following list are required to be conducted.

Group B

Experiment-1 Formation of YBUS.
Experiment-2 Load Flow Analysis using Gauss Seidal (GS) Method.
Experiment-3 Load Flow Analysis using Fast Decoupled (FD) Method.
Experiment-4 Formation of ZBUS.
Experiment-5 Simulation of Compensated Line

REFERENCE BOOKS:

1. C.L. Wadhwa: Electrical Power Systems –Third Edition, New Age International Pub. Co., 2001.
2. Hadi Sadat: Power System Analysis –Tata Mc Graw Hill Pub. Co. 2002.

WEB REFERENCES:

1. https://www.ietlucknow.ac.in
2. https://web.fe.up.pt

CONTROL SYSTEM LAB

III B.Tech-II Semester **L T P C**
Course Code: A2EE604PC **0 0 2 1**

COURSE OBJECTIVES:

Learn

1. To understand the different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response
2. To assess the system performance using time domain analysis and methods for improving it
3. To assess the system performance using frequency domain analysis and techniques for improving the performance
4. To design various controllers and compensators to improve system performance

COURSE OUTCOMES:

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

1. How to improve the system performance by selecting a suitable controller and/or a compensator for a specific application
2. Apply various time domain and frequency domain techniques to assess the system performance
3. Apply various control strategies to different applications(example: Power systems, electrical drives etc)
4. Test system controllability and observability using state space representation and applications of state space representation to various systems

LIST OF EXPERIMENTS

Experiment-1 Time response of Second order system
Experiment-2 Characteristics of Synchros
Experiment-3 Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions, and application of speed control of motor
Experiment-4 Effect of feedback on DC servo motor
Experiment-5 Transfer function of DC motor
Experiment-6 Transfer function of DC generator
Experiment-7 Temperature controller using PID
Experiment-8 Characteristics of AC servo motor
Experiment-9 Effect of P, PD, PI, PID Controller on a second order systems
Experiment-10 Lag and lead compensation – Magnitude and phase plot
Experiment-11 (a) Simulation of P, PI, PID Controller.
(b) Linear system analysis (Time domain analysis, Error analysis) using suitable software
Experiment-12 Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using suitable software
Experiment-13 State space model for classical transfer function using suitable Software -Verification.

TEXT BOOKS:

1. M. Gopal, “Control Systems: Principles and Design”, McGraw Hill Education,1997
B. C. Kuo, “Automatic Control System”, Prentice Hall,1995

REFERENCE BOOKS:

1. K. Ogata, “Modern Control Engineering”, Prentice Hall, 1991.
2. J. Nagrath and M. Gopal, “Control Systems Engineering”, New Age International, 2009.

WEB REFERENCES:

1. http://mist.ac.in/pdfs/LabManuals/EEE/ControlSytemLab.pdf
1. http://www.kfupm.edu.sa/departments/se/SiteCollectionDocuments/CISE-302-Linear-Control- Systems-LabManual.pdf
2. https://www.iitk.ac.in/ee/data/Teaching_labs/Control_System/EE380_labmanual.pdf

DIGITAL SIGNAL PROCESSING LAB

III B.Tech-II Semester **L T P C**
Course Code: A2EC603ES **0 0 2 1**

COURSE OBJECTIVES:

Learn

1. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
2. To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
3. To implement simple logical operations using combinational logic circuits
4. To design combinational logic circuits, sequential logic circuits.
5. To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
6. To implement synchronous state machines using flip-flops.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

1. Understand working of logic families and logic gates.
3. Design and implement Combinational and Sequential logic circuits.
4. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
5. Be able to use PLDs to implement the given logical problem.

LIST OF EXPERIMENTS

1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. Generation of clock using NAND / NOR gates
4. Design a 4 – bit Adder / Subtractor
5. Design and realization a 4 – bit gray to Binary and Binary to Gray Converter
6. Design and realization of a 4-bit pseudo random sequence generator using logic gates.
7. Design and realization of an 8-bit parallel load and serial out shift register using flip-flops.
8. Design and realization a Synchronous and Asynchronous counters using flip-flops
9. Design and realization of Asynchronous counters using flip-flops
10. Design and realization 8x1 using 2x1 mux
11. Design and realization 2-bit comparator
12. Verification of truth tables and excitation tables
13. Realization of logic gates using DTL, TTL, ECL, etc.,
14. State machines

TEXT BOOKS:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

REFERENCE BOOK:

1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

IV-YEAR (I-SEMESTER)

POWER ELECTRONIC APPLICATIONS TO RENEWABLE ENERGY SYSTEMS

IV B.Tech-I Semester **L T P C**
Course Code: A2EE720PC **3 1 0 4**

COURSE OBJECTIVES:

1. To Provide knowledge about the stand alone and grid connected renewable energy systems.
2. To equip with required skills to derive the criteria for the design of power converters for renewable energy applications.
3. To analyse and comprehend the various operating modes of wind electrical generators and solar energy systems.
4. To design different power converters namely AC to DC, DC to DC and AC to AC converters for renewable energy systems.
5. To develop maximum power point tracking algorithms.

COURSE OUTCOMES:

1. Ability to understand and analyze power system operation, stability, control and protection.
2. Ability to handle the engineering aspects of electrical energy generation and utilization.

UNIT I INTRODUCTION

Environmental aspects of electric energy conversion: impacts of renewable energy generation on environment (cost-GHG Emission) - Qualitative study of different renewable energy resources: Solar, wind, ocean, Biomass, Fuel cell, Hydrogen energy systems and hybrid renewable energy systems.

UNIT II ELECTRICAL MACHINES FOR RENEWABLE ENERGY CONVERSION

Reference theory fundamentals-principle of operation and analysis: IG, PMSG, SCIG and DFIG.

UNIT III POWER CONVERTERS

Solar: Block diagram of solar photo voltaic system -Principle of operation: line commutated converters (inversion-mode) - Boost and buck-boost converters- selection of inverter, battery sizing, array sizing Wind: Three phase AC voltage controllers- AC-DC-AC converters: uncontrolled rectifiers, PWM Inverters, Grid Interactive Inverters-matrix converters.

UNIT IV ANALYSIS OF WIND AND PV SYSTEMS

Stand alone operation of fixed and variable speed wind energy conversion systems and solar system- Grid connection Issues -Grid integrated PMSG, SCIG Based WECS, grid Integrated solar system

UNIT V HYBRID RENEWABLE ENERGY SYSTEMS

Need for Hybrid Systems- Range and type of Hybrid systems- Case studies of Wind-PV Maximum Power Point Tracking (MPPT).

TEXT BOOK:

1. S. N. Bhadra, D.Kastha, S.Banerjee, “Wind Electrical Systems”, Oxford University Press, 2005.
2. B.H.Khan Non-conventional Energy sources Tata McGraw-hill Publishing Company, New Delhi,2009.

REFERENCES:

1. Rashid .M. H “power electronics Hand book”, Academic press, 2001.
2. Ion Boldea, “Variable speed generators”, Taylor & Francis group, 2006.
3. Rai. G.D, “Non conventional energy sources”, Khanna publishes, 1993.
4. Gray, L. Johnson, “Wind energy system”, prentice hall linc, 1995.

WEB REFERENCES:

1. https://onlinelibrary.wiley.com/doi/book/10.1002/9781118755525
2. https://www.wiley.com/en-in/Power+Electronics+for+Renewable+Energy+Systems%2C+Transportation+and+Industrial+Applications-p-9781118634035

E-TEXT BOOKS:

1. https://ieeexplore.ieee.org/document/4778368

MOOCS COURSES:

1. https://www.academia.edu/31595631/Power_Electronics_for_Renewable_Energy_Systems_Transportation_and_Industrial_Applications

UTILIZATION OF ELECTRICAL ENERGY
(Open Elective – II)

IV B.Tech-I Semester **L T P C**
Course Code: A2EE703OE **3 0 0 3**

COURSE OBJECTIVES:

Objectives of this course are

1. To understand the fundamentals of illumination and good lighting practices
2. To understand the methods of electric heating and welding.
3. To understand the concepts of electric drives and their application to electrical traction systems.

COURSE OUTCOMES:

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

1. Understand basic principles of electric heating and welding.
2. Determine the lighting requirements for flood lighting, household and industrial needs.
3. Calculate heat developed in induction furnace.
4. Evaluate speed time curves for traction

UNIT I ELECTRICAL HEATING

Advantages and methods of electric heating, resistance heating, induction heating and dielectric heating.

UNIT II ELECTRIC WELDING

Electric welding equipment, resistance welding and arc welding, comparison between AC and DC welding. Electrolysis process: principle of electrolysis, electroplating, metal extraction and metal processing, electromagnetic stirs.

UNIT III ILLUMINATION

Terminology, Laws of illumination, coefficient of Utilization and depreciation, Polar curves, Photometry, integrating sphere, sources of light, fluorescent lamps, compact fluorescent lamps, LED lamps discharge lamps, mercury vapor lamps, sodium vapor lamps and neon lamps, comparison between tungsten filament lamps and fluorescent tubes. Basic principles of light control, Types and design of lighting scheme, lighting calculations, factory lighting, street lighting and flood lighting.

UNIT IV ELECTRIC TRACTION

Systems of electric traction and track electrification- DC system, single phase and 3-phase low frequency and high frequency system, composite system, kando system, comparison between AC and DC systems, problems of single-phase traction with current unbalance and voltage unbalance. Mechanics of traction movement, speed – time curves for different services, trapezoidal and quadrilateral speed – time curves, tractive effort, power, specific energy consumption, effect of varying acceleration and braking, retardation, adhesive weight and braking retardation, coefficient of adhesion.

UNIT V SYSTEMS OF TRAIN LIGHTING

special requirements of train lighting, methods of obtaining unidirectional polarity constant output- single battery system, Double battery parallel block system, coach wiring, lighting by making use of 25KV AC supply.

TEXT BOOKS:

1. H. Partab: Modern Electric Traction, Dhanpat Rai & Co, 2007.
2. E. Openshaw Taylor: Utilization of Electric Energy, Orient Longman, 2010.

REFERENCE BOOKS:

1. H. Partab: Art & Science of Utilization of Electric Energy, Dhanpat Rai & Sons, 1998.
2. N.V. Suryanarayana: Utilisation of Electrical power including Electric drives and Electric Traction, New Age Publishers, 1997.

WEB REFERENCES:

1. https://www.ijert.org/utilization-of-electrical-energy-its-recent-advancements
2. https://www.oreilly.com/library/view/generation-and-utilization/9789332515673/

E-TEXT BOOKS:

1. https://www.iare.ac.in/sites/default/files/Courses_description/EEE_Utilization_of_Electric_Power_Syllabus.pdf
2. http://www.velhightech.com/Documents/EE6801-EEGUC.pdf

MOOCS COURSES:

1. https://ieeexplore.ieee.org/document/9718651

ENERGY STORAGE SYSTEMS
(Open Elective-II)

IV B.Tech-I Semester **L T P C**
Course Code: A2EE704OE **3 0 0 3**

COURSE OBJECTIVES:

The course should enable the students:

1. To enable the student to understand the need for energy storage, devices

COURSE OUTCOMES:

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

1. Analyze the characteristics of energy from various sources and need for storage
2. Classify various types of energy storage and various devices used for the purpose
3. Identify various real time applications

UNIT I ELECTRICAL ENERGY STORAGE TECHNOLOGIES

Characteristics of electricity, Electricity and the roles of EES, High generation cost during peak demand periods, Need for continuous and flexible supply, Long distance between generation and consumption, Congestion in power grids, Transmission by cable

UNIT II NEEDS FOR ELECTRICAL ENERGY STORAGE

Emerging needs for EES, More renewable energy ,less fossil fuel, Smart Grid uses, The roles of electrical energy storage technologies, The roles from the viewpoint of a utility, The roles from the viewpoint of consumers, The roles from the viewpoint of generators of renewable energy.

UNIT III FEATURES OF ENERGY STORAGE SYSTEMS

Classification of EES systems , Mechanical storage systems, Pumped hydro storage (PHS), Compressed air energy storage (CAES), Flywheel energy storage (FES),Electrochemical storage systems, Secondary batteries, Flow batteries, Chemical energy storage, Hydrogen (H2), Synthetic natural gas (SNG).

UNIT IV TYPES OF ELECTRICAL ENERGY STORAGE SYSTEMS

Electrical storage systems, Double-layer capacitors (DLC), Superconducting magnetic energy storage (SMES), Thermal storage systems, Standards for EES, Technical comparison of EES technologies).

UNIT V APPLICATIONS

Present status of applications, Utility use (conventional power generation, grid operation & service) , Consumer use (uninterruptable power supply for large consumers), New trends in applications ,Renewable energy generation, Smart Grid, Smart Micro grid, Smart House, Electric vehicles, Management and control hierarchy of storage systems,

TEXT BOOKS:

1. James M. Eyer, Joseph J. Iannucci and Garth P. Corey “, “Energy Storage Benefits and Market Analysis”, Sandia National Laboratories, 2004.
2. The Electrical Energy Storage by IEC Market Strategy Board

WEB REFERENCE:

1. https://onlinelibrary.wiley.com/journal/25784862

E-TEXT BOOK:

1. https://www.sciencedirect.com/journal/journal-of-energy-storage

MOOCS COURSES:

1. https://swayam.gov.in/
2. https://onlinecourses.nptel.ac.in

MOBILE APPLICATION DEVELOPMENT
(Professional Elective –III)

IV B.Tech-I Semester **L T P C**
Course Code: A2EE707PE **3 0 0 3**

COURSE OBJECTIVES:

To learn

1. To demonstrate their understanding of the fundamentals of Android operating systems
2. To improves their skills of using Android software development tools
3. To demonstrate their ability to develop software with reasonable complexity on mobile platform
4. To demonstrate their ability to deploy software to mobile devices
5. To demonstrate their ability to debug programs running on mobile devices

COURSE OUTCOMES:

1. Student understands the working of Android OS Practically.
2. Student will be able to develop Android user interfaces
3. Student will be able to develop, deploy and maintain the Android Applications.

UNIT I INTRODUCTION TO ANDROID OPERATING SYSTEM

Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

UNIT II ANDROID USER INTERFACE

Android User Interface: Measurements – Device and pixel density independent measuring UNIT – s Layouts – Linear, Relative, Grid and Table Layouts User Interface (UI) Components – Editable and non-editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers Event Handling – Handling clicks or changes of various UI components Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT III INTENTS AND BROADCASTS

Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity Notifications – Creating and Displaying notifications, Displaying Toasts

UNIT IV PERSISTENT STORAGE

Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

UNIT V DATABASE

Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

TEXT BOOKS:

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

REFERENCE BOOKS:

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

WEB REFERENCES:

1. https://www.d.umn.edu/itss/training/online/webdesign/books.html
2. https://www.w3schools.com/whatis/
3. https://www.quora.com/What-is-the-reference-for-Web-development

E -TEXT BOOKS:

1. https://www.amazon.com/Mobile-Application-Development-Books/s?k=Mobile+Application+Development+Books
2. https://www.shopify.com/in/partners/blog/app-development-books

MOOCS COURSE:

1. https://www.quora.com/What-is-the-reference-for-Web-development

SIGNALS & SYSTEMS
(Professional Elective –III)

IV B.Tech-I Semester **L T P C**
Course Code: A2EE708PE **3 0 0 3**

COURSE OBJECTIVE:
1. This gives the basics of Signals and Systems required for all Electrical Engineering related Courses.
2. To understand the behavior of signal in time and frequency domain
3. To understand the characteristics of LTI systems
4. This gives concepts of Signals and Systems and its analysis using different transform Techniques.

COURSE OUTCOMES:
Differentiate various signal functions.
1. Represent any arbitrary signal in time and frequency domain.
2. Understand the characteristics of linear time invariant systems.
3. Analyze the signals with different transform technique

UNIT I SIGNAL ANALYSIS
Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Classification of Signals and systems, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

UNIT II FOURIER SERIES AND FOURIER TRANSFORMS:
Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum.
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 Transform, Fourier Transforms involving Impulse function and Signum function, Introduction to Hilbert Transform.

UNIT III SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS:
Linear System, Impulse response, Response of a Linear System, Linear Time Invariant(LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI System, Filter characteristic of Linear System, Distortion less transmission through a system, Signal bandwidth, System Bandwidth, Ideal LPF, HPF, and BPF characteristics, Causality and Paley- Wiener criterion for physical realization, Relationship between Bandwidth and rise time, Convolution and Correlation of Signals, Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution.

UNIT IV LAPLACE TRANSFORMS
Laplace Transforms (L.T), Inverse Laplace Transform, Concept of Region of Convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis.
Z–Transforms: Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

UNIT V SAMPLING THEOREM:
Graphical and analytical proof for Band Limited Signals, Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass Sampling.
Correlation: Cross Correlation and Auto Correlation of Functions, Properties of Correlation Functions, Energy Density Spectrum, Parsevals Theorem, Power Density Spectrum, Relation between Autocorrelation Function and Energy/Power Spectral Density Function, Relation between Convolution and Correlation, Detection of Periodic Signals in the presence of Noise by Correlation, Extraction of Signal from Noise by Filtering.

TEXT BOOKS:

1. Signals, Systems & Communications - B.P. Lathi, 2013, BSP.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawabi, 2 Ed.

REFERENCE BOOKS:

1. Signals and Systems – Simon Haykin and Van Veen, Wiley 2 Ed.,
2. Signals and Systems – A. Rama Krishna Rao, 2008, TMH
3. Fundamentals of Signals and Systems - Michel J. Robert, 2008, MGH International Edition.
4. Signals, Systems and Transforms - C. L. Philips, J. M. Parr and Eve A. Riskin, 3 Ed., 2004, PE.
5. Signals and Systems – K. Deergha Rao, Birkhauser, 2018.

WEB REFERENCES:

1. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/
2. https://www.entcengg.com/signals-system-reference-books/
3. https://onlinelibrary.wiley.com/doi/book/10.1002/9780470823552

E-TEXT BOOKS:

1. https://mlichouri.files.wordpress.com/2013/10/fundamentals-of-signals-and-systems.pdf
2. https://eng.libretexts.org/Bookshelves/Electrical_Engineering/Signal_Processing_and_Modeling/Book%3A_Signals_and_Systems_(Baraniuk_et_al.)

MOOCS COURSES:

1. https://www.coursera.org/courses?query=signals%20and%20systems
2. https://www.classcentral.com/course/swayam-principles-of-signals-and-systems-9900
3. https://nptel.ac.in/courses/108/104/108104100/

ELECTRICAL & HYBRID VEHICLES
(Professional Elective –III)

IV-B.Tech-I Semester **L T P C**
Course Code: A2EE709PE **3 0 0 3**

COURSE OBJECTIVES
The course should enable the students:
1. To understand the fundamental concepts, principles, analysis and design of hybrid and electricvehicles.
2. To know the various aspects of hybrid and electric drive train such as their configuration, types of electric machines that can be used energy storage devices,etc.

COURSE OUTCOMES
At the end of the course, student will be able to:
1. Understand the different possible ways of energy storage.
2. Understand the different strategies related to energy storage systems.
3. Understand the models to describe hybrid vehicles and their performance

UNIT I INTRODUCTION
Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, mathematical models to describe vehicle performance

UNIT II INTRODUCTION TO HYBRID ELECTRIC VEHICLES, HYBRID ELECTRIC DRIVE-TRAINS
History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.
Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiencyanalysis.

UNIT-III ELECTRIC TRAINS, ELECTRIC PROPULSION UNIT
Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.
Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT-IV ENERGY STORAGE
Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices. Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supportingsubsystems

UNIT-V ENERGY MANAGEMENT STRATEGIES
Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies

TEXT BOOKS:

1. C. Mi, M. A. Masrur and D. W. Gao, "Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives", John Wiley & Sons,2011.
2. S. Onori, L. Serrao and G. Rizzoni, "Hybrid Electric Vehicles: Energy Management Strategies", Springer,2015.

REFERENCE BOOKS:

1. M. Ehsani, Y. Gao, S. E. Gay and A. Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design", CRC Press,2004.
2. T. Denton, "Electric and Hybrid Vehicles", Routledge,2016.

WEBSITE REFERENCES:

1. http://www.ieahev.org/assets/1/7/IA-HEV_2010_annual_report_6MB.pdf
2. https://www.researchgate.net/publication/317889386_Hybrid_Electric_Vehicles
3. https://www.govinfo.gov/content/pkg/GOVPUB-C13-5b831467adb48f2bfe6aa8895c1f05b5/pdf/GOVPUB-C13-5b831467adb48f2bfe6aa8895c1f05b5.pdf

E-TEXT BOOKS:

1. https://www.routledge.com/rsc/downloads/CRC_Hybrid_Vehicles_Freebook.pdf
2. http://ceb.ac.in/knowledge-center/E-BOOKS/Modern%20Electric ,%20Hybrid%20Electric% 20&%20Fuel%20Cell%20Vehicles%20-%20Mehrdad%20Ehsani.pdf

MOOCS COURSES:

1. https://nptel.ac.in/courses/108/103/108103009/
2. https://www.edx.org/learn/hybrid-vehicles

HVDC TRANSMISSION
(Professional Elective - IV)

IV B.Tech-I Semester **L T P C**
Course Code: A2EE710PE **3 0 0 3**

COURSE OBJECTIVES:

The course should enable the students:

1. To compare EHV ac and HVDC systems
2. To analyse graetz circuit and also explain 6 and 12 pulse converters
3. To control hvdc systems with various methods and to perform power flow analysis in ac/dc systems
4. To describe various protection methods for hvdc systems and harmonics

COURSE OUTCOMES:

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

1. Compare EHV ac and hvdc system and to describe various types of dc links
2. Analyze graetz circuit for rectifier and inverter mode of operation
3. Describe various methods for the control of hvdc systems and to perform power flow analysis in ac/dc systems
4. Describe various protection methods for hvdc systems and classify harmonics and design different types of filters

UNIT-I BASIC CONCEPTS, ANALYSIS OF HVDC CONVERTERS

Necessity of HVDC systems, economics and terminal equipment of hvdc transmission systems, types of hvdc links, apparatus required for hvdc systems, comparison of ac and dc transmission, application of dc transmission system, planning and modern trends in d.c. transmission.

Choice of converter configuration, analysis of graetz circuit, characteristics of 6 pulse and 12 pulse converters, cases of two 3 phase converters in y/y mode – their performance.

UNIT -II CONVERTER AND HVDC SYSTEM CONTROL, REACTIVE POWER CONTROL IN HVDC

Principle of dc link control, converters control characteristics, firing angle control, current and extinction angle control, effect of source inductance on the system, starting and stopping of dc link, power control. Introduction, reactive power requirements in steady state, sources of reactive power- static var compensators, reactive power control during transients

UNIT -III POWER FLOW ANALYSIS IN AC/DC SYSTEMS

Modelling of dc links, dc network, dc converter, controller equations, solution of dc load flow, p.u. system for dc quantities, solution of ac-dc power flow-simultaneous method-sequential method.

UNIT -IV CONVERTER FAULTS AND PROTECTION

converter faults, protection against over current and over voltage in converter station, surge arresters, smoothing reactors, dc breakers, audible noise, space charge field, corona effects on dc lines, radio interference.

UNIT-V HARMONICS, FILTERS

Generation of harmonics, characteristics harmonics, calculation of ac harmonics, non- characteristics harmonics, adverse effects of harmonics, calculation of voltage and current harmonics, effect of pulse number on harmonicstypes of ac filters, design of single tuned filters –design of high pass filters.

TEXT BOOKS:

1. "K. R. Padiyar", Hvdc Power Transmission Systems: Technology And System Interactions, New Age International (P) Limited, And Publishers, 1990.
2. "S K Kamakshaiah, V Kamaraju", Hvdc Transmission, Tmh Publishers, 2011

REFERENCE BOOKS:

1. "Jos Arrillaga", Hvdc Transmission, the Institution of Electrical Engineers, IEE Power & Energy Series 29, 2nd Edition 1998.
2. "E. W. Kimbark", Direct Current Transmission, John Wiley and Sons, Volume 1, 1971.
3. "E. Uhlmann", Power Transmission By Direct Current, B. S. Publications, 2009
4. "S. Rao", Ehvac and Hvdc Transmission Engineering and Practice, Khanna Publications, 3rd Edition 1999.

WEB REFERENCES:

1. https://www.sanfoundry.com/best-reference-books-hvdc-transmission/
2. https://easyengineering.net/hvdc-power-transmission-systems-by-padiyar/

E TEXT BOOKS:

1. https://easyengineering.net/hvdc-power-transmission-systems-by-padiyar/
2. https://books.google.co.in/books/about/HVDC_Power_Transmission_Systems.html?id=gSoDaumDrjC

MOOCS COURSE:

1. https://www.coursebuffet.com/sub/electrical-engineering/488/high-voltage-dc-transmission
2. https://www.classcentral.com/course/swayam-dc-power-transmission-systems-17562

POWER SYSTEM RELIABILITY
(Professional Elective - IV)

IV B.Tech-I Semester **L T P C**
Course Code: A2EE711PE **3 0 0 3**

COURSE OBJECTIVES:

To learn
1. To describe the generation system model and recursive relation for capacitive model building
2. To explain the equivalent transitional rates, cumulative probability and cumulative frequency
3. To develop the understanding of risk, system and load point reliability indices
4. To explain the basic and performance reliability indices

COURSE OUTCOMES:

Upon the completion of this course, the student will be able to
1. Estimate loss of load and energy indices for generation systems model
2. Describe merging generation and load models
3. Apply various indices for distribution systems
4. Evaluate reliability of interconnected 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, Weibull 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 GENERATING SYSTEM RELIABILITY ANALYSIS

Generation system model – capacity outage probability tables – Recursive relation for capacitive model building – sequential addition method – unit removal – Evaluation of loss of load and energy indices – Examples. Frequency and Duration methods – Evaluation of equivalent transitional rates of identical and non-identical units – Evaluation of cumulative probability and cumulative frequency of non-identical generating units – 2-level daily load representation - merging generation and load models – Examples.

UNIT III OPERATING RESERVE EVALUATION

Basic concepts - risk indices – PJM methods – security function approach – rapid start and hot reserve units – Modeling using STPM approach. **Bulk Power System Reliability Evaluation:** Basic configuration – conditional probability approach – system and load point reliability indices – weather effects on transmission lines – Weighted average rate and Markov model – Common mode failures.

Inter Connected System Reliability Analysis: Probability array method – Two inter connected systems with independent loads – effects of limited and unlimited tie capacity - imperfect tie – Two connected Systems with correlated loads – Expression for cumulative probability and cumulative frequency.

UNIT IV DISTRIBUTION SYSTEM RELIABILITY ANALYSIS

Basic Techniques – Radial networks –Evaluation of Basic reliability indices, performance indices – load point and system reliability indices – customer oriented, loss and energy-oriented indices – Examples. Basic concepts of parallel distribution system reliability

UNIT V SUBSTATIONS AND SWITCHING STATIONS

Effects of short-circuits - breaker operation – Open and Shortcircuit failures – Active and Passive failures – switching after faults – circuit breaker model – preventive maintenance – exponential maintenance times.

TEXT BOOKS:

1. Reliability Evaluation of Power systems by R. Billinton, R.N. Allan, BS Publications, 2007.
2. Reliability Modeling in Electric Power Systems by J. Endrenyi, John Wiley and Sons, 1978

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 E. Balaguruswamy, TMH Publications.
4. Reliability Engineering by Elsayed A. Elsayed, Prentice Hall Publications

WEB REFERENCES:

1. https://link.springer.com/chapter/10.1007/978-1-84996-232-2_8
2. https://link.springer.com/chapter/10.1007/978-1-84628-498-4_6

E -TEXT BOOKS:

1. https://www.amazon.com/Electric-Power-System-Reliability-William/dp/069294589X
2. https://www.amazon.com/Electric-Power-System-Reliability-William/dp/069294589X

MOOCS COURSE:

1. https://link.springer.com/chapter/10.1007/978-1-84628-498-4_6

EMBEDDED APPLICATIONS
(Professional Elective - IV)

IV B.Tech-I Semester **L T P C**
Course Code: A2EE712PE **3 0 0 3**

COURSE OBJECTIVES:
The course should enable the students:
1. This course deals with the three main application areas of Network Embedded Systems.
2. Wireless Sensor Networks, Automotive, and Industrial Automation and relatively new subtopic of Home Automation

COURSE OUTCOMES:
At the end of the course, student will be able to:
1. To give an introduction to and developing Deeply Embedded Systems

UNIT-I
Network Embedded Systems an Overview, Introduction to WSNs, Architecture for WSNs

UNIT -II
Time Sync Issues & Resource Aware Localization , Power Aware Routing Issues & Protocols, Energy Efficient MAC Protocols,

UNIT –III
Tiny OS , Configuration & Management of Networked Embedded Devices, Networked Control Systems for Manufacturing, Wireless LAN technology.

UNIT -IV
Wireless LAN,PAN, Hybrid Wired/Wireless RT-Industrial Networks, WSN for Automation, Trend in Automotive Communication Systems , Time – Triggered Communication

UNIT-V
Controller Area Networks, Flex Ray Communications, LIN , Field Bus, Real-Time Ethernet , Home Automation

TEXT BOOKS:
1. R.Zurawski, Network Embedded Systems, CRC press, 2009.
2. G.Pottie, W.Kaiser, Principles of Embedded Networked System Design

REFERENCE BOOKS:
1. Raj Kamal, Embedded Systems, Tata McGraw Hill, New Delhi, 2003
2. IEEE Journals and Transactions.
3. IETF Drafts and RFCs
4. ACM Transactions

WEB REFERENCES:
1. https://ptolemy.berkeley.edu/projects/chess/eecs149/references.html
2. https://en.wikipedia.org/wiki/Embedded_system
3. https://www.techtarget.com/iotagenda/definition/embedded-system

E TEXT BOOKS:

1. https://realtimelogic.com/articles/What-is-an-Embedded-Application-Server
2. https://www.sciencedirect.com/science/article/abs/pii/S014193312030781X

MOOCS COURSE:

1. https://www.trentonsystems.com/blog/what-are-embedded-systems

FUNDAMENTALS OF MANAGEMENT FOR ENGINEERS

IV B.Tech-I Semester **L T P C**

Course Code: A2MB721HS **3 1 0 4**

COURSE OBJECTIVE:

1. To understand the Management Concepts, applications of Concepts in Practical aspects of business and development of Managerial Skills for Engineers.

COURSE OUTCOME:

1. The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.

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; Production Planning and Control. 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: Job Satisfaction, Job Enrichment, Job Enlargement, Talent Management, 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 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 Essentials, Andrew DuBrin, 9e, Cengage Learning, 2012.
2. Fundamentals of Management, Stephen P. Robbins, Pearson Education, 2009.

REFERENCE BOOKS:

1. Essentials of Management, Koontz Kleihrich, Tata Mc - Graw Hill.
2. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.
3. Industrial Engineering and Management: Including Production Management, T.R. Banga, S.C. Sharma, Khanna Publishers.

WEB REFERENCES:

1. https://openstax.org/books/principles-management/pages/references
2. https://books.google.co.in/books/about/Fundamentals_of_Management_JNTU.html?id=03flDwAAQBAJ&redir_esc=y

E-TEXT BOOKS:

1. https://books.google.co.in/books/about/Principles_of_MANAGEMENT.html?id=jHmY2oclfucC&redir_esc=y

MOOCS COURSES:

1. https://openstax.org/books/principles-management/pages/references

SIMULATION OF RENEWABLE ENERGY SYSTEMS LAB

IV B.Tech-I Semester **L T P C**
Course Code: A2EE722PC **0 0 2 1**

COURSE OBJECTIVES:

1. To train the students in Renewable Energy Sources and technologies.
2. To provide adequate inputs on a variety of issues in harnessing Renewable Energy.
3. To recognize current and possible future role of Renewable energy sources.

LIST OF EXPERIMENTS

1. Simulation study on Solar PV Energy System.
2. Experiment on "VI-Characteristics and Efficiency of 1kWp Solar PV System".
3. Experiment on "Shadowing effect & diode based solution in1kWp Solar PV system".
4. Experiment on Performance assessment of Grid connected and Standalone 1kWp Solar Power System.
5. Simulation study on Wind Energy Generator.
6. Experiment on Performance assessment of micro Wind Energy Generator.
7. Simulation study on Hybrid (Solar-Wind) Power System.
8. Experiment on Performance Assessment of Hybrid (Solar-Wind) Power System.
9. Simulation study on Hydel Power.
10. Experiment on Performance Assessment of 100W Fuel.

REFERENCE BOOKS:

1. M. H. Rashid, Simulation of Electric and Electronic circuits using PSPICE – by M/s PHI Publications
2. User's manual of related software's
3. Rashid, Spice for power electronics and electric power, CRC Press

WEB REFERENCES:

1. https://onlinelibrary.wiley.com/doi/abs/10.1002/cae.21673
2. https://ceme.ece.illinois.edu/files/2014/07/ECE469V25.pdf
3. https://web.ecs.baylor.edu/faculty/grady/Grady_UT_Austin_EE462L_Fall_2010.pdf

IV-YEAR (II-SEMESTER)

CHARGING INFRASTRUCTURE FOR ELECTRIC VEHICLE
(Open Elective – III)

IV B.Tech-II Semester **L T P C**
Course Code: A2EE805OE **3 0 0 3**

COURSE OBJECTIVES:
1. To understand the fundamental concepts, principles, analysis and design of electric vehicles.
2. To know the various aspects of electric drive train such as their configuration, types of electric machines that can be used energy storage devices, etc.

COURSE OUTCOMES:
Elaborate various technical parameters of batteries
1. Distinguish between various types of batteries used for EV applications
2. To develop battery charger for an EV

UNIT I BATTERY PARAMETERS
Cell and battery voltages, Charge (or Amphour) capacity, Energy stored, Energy density, Specific power, Amphour (or charge) efficiency, Energy efficiency, Self-discharge rates, Battery eometry, Battery temperature, heating and cooling needs, Battery life and number of deep cycles

UNIT II EV BATTERIES
Lead Acid Batteries
Lead acid battery basics, Special characteristics of lead acid batteries, Battery life and aintenance, Battery charging, Summary
Nickel-based Batteries
Introduction, Nickel cadmium, Nickel metal hydride batteries

UNIT III SODIUM, LITHIUM AND METAL AIR BATTERIES
Sodium-based Batteries
Introduction, Sodium sulphur batteries, Sodium metal chloride (Zebra) batteries
Lithium Batteries
Introduction, The lithium polymer battery, The lithium ion battery
Metal Air Batteries
Introduction, The aluminium air battery, The zinc air battery

UNIT IV CHARGING INFRASTRUCTURE
Domestic Charging Infrastructure, Public Charging Infrastructure, Normal Charging Station, Occasional Charging Station, Fast Charging Station, Battery Swapping Station, Move-and-charge zone.

UNIT V EV CHARGING
Battery Chargers: Charge equalisation, Conductive (Basic charger circuits, Microprocessor based charger circuit. Arrangement of an off-board conductive charger, Standard power levels of conductive chargers, Inductive (Principle of inductive charging, Soft-switching power converter for inductive charging), Battery indication methods

TEXT BOOKS:
1. James Larminie Oxford Brookes University, Oxford, UK John Lowry Acenti Designs Ltd., UK, Electric Vehicle Technology Explained
2. C.C Chan, K.T Chau: Modern Electric Vehicle Technology, Oxford University Press Inc., New York 2001.

REFERENCE BOOKS:

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004.
3. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.

WEB REFERENCES:

1. https://www.niti.gov.in/sites/default/files/2021-08/HandbookforEVChargingInfrastructureImplementation081221.pdf

E-TEXT BOOKS:

1. https://e-amrit.niti.gov.in/standards-and-specifications
2. https://powermin.gov.in/en/content/electric-vehicle

MOOCS COURSES:

1. https://www.researchgate.net/publication/354295415_Electric_Vehicle_Charging_Station

RELIABILITY ENGINEERING
(Open Elective – III)

IV B.Tech-II Semester **L T P C**
Course Code: A2EE806OE **3 0 0 3**

COURSE OBJECTIVES:

1. To introduce the basic concepts of reliability, various models of reliability
2. To analyze reliability of various systems
3. To introduce techniques of frequency and duration for reliability evaluation of repairable systems

COURSE OUTCOMES:

After completion of this course, the student will be able to

1. model various systems applying reliability networks
2. evaluate the reliability of simple and complex systems
3. estimate the limiting state probabilities of repairable systems
4. 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- Mathematical expected – variance and standard deviation

Binomial Distribution: Concepts, properties, engineering applications.

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 PROBABILITY DISTRIBUTIONS IN RELIABILITY EVALUATION

Distribution concepts, Terminology of distributions, General reliability functions, Evaluation of the reliability functions, shape of reliability functions –Poisson distribution – normal distribution, exponential distribution, Weibull distribution.

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.

WEB REFERENCES:

1. https://onlinelibrary.wiley.com/journal/10991638
2. https://en.wikipedia.org/wiki/Site_reliability_engineering

E-TEXT BOOKS:

1. https://sre.google/books/

MOOCS COURSES:

1. https://www.sciencedirect.com/journal/reliability-engineering-and-system-safety

POWER QUALITY& FACTS
(Professional Elective - V)

IV B.Tech-II Semester **L T P C**
Course Code: A2EE813PE **3 0 0 3**

COURSE OBJECTIVES:

The course should enable the students to:

1. Know different terms of power quality.
2. Illustrate power quality issues for short and long interruptions.
3. Construct study of characterization of voltage sag magnitude and three phase unbalanced Voltage sag.
4. To understand the fundamentals of FACTS Controllers
5. To know the importance of controllable parameters and types of FACTS controllers & their benefits

COURSE OUTCOMES:

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

1. Choose proper controller for the specific application based on system requirements
2. Understand various systems thoroughly and their requirements
3. Know the severity of power quality problems in distribution system;
4. Understand the concept of voltage sag transformation from up-stream (higher voltages) to
5. Down-stream (lower voltage)

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 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, and benefits from FACTS controllers

UNIT–IV 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 –V 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

TEXT BOOKS:

1. Math H J Bollen "Understanding Power Quality Problems", IEEE Press.
2. R.C. Dugan, M.F. Mcgranaghan and H.W. Beaty, "Electric Power Systems Quality." New York: Mcgraw-Hill.1996
3. "N.G. Hingorani and L. Guygi", Understanding FACTS Devices, IEEE Press Publications2000.
4. "Yong- Hua Song, Allan Johns", Flexible AC Transmission System, IEE Press1999

REFERENCE BOOKS:

1. G.T. Heydt, 'Electric Power Quality', 2nd Edition. (West Lafayette, In, Stars In A Circle Publications, 1994).
2. Power Quality Var Compensation In Power Systems, R. Sastry Vedam Mulukutla S.Sarma, Crc Press.
3. "KalyanK. Sen and Meylingsen", Introduction to FACTS Controllers, John wiley& sons, Inc., Mohamed E. EI – Hawary Series editor, 2009.
4. "K. R Padiyar, Motilal", FACTS controllers in power transmission and distribution UK Books of India2007.

WEB REFERENCES:

1. https://www.efunda.com/math/math_home/math.cfm
2. https://www.ocw.mit.edu/resources/#mathematics
3. https://en.wikipedia.org/wiki/Flexible_AC_transmission_system
4. https://www.sciencedirect.com/topics/engineering/flexible-ac-transmission-systems

E-TEXT BOOKS:

1. https://www.e-booksdirectory.com/details.php?ebook=10166
2. https://books.google.co.in/books/about/Flexible_Ac_Transmission_Systems_FACTS.html?id=AqPr4JyDWg0C
3. https://www.routledge.com/Flexible-AC-Transmission-Systems-FACTS-Newton-Power-Flow-Modeling-of/Bhowmick/p/book/9781498756198

MOOCS COURSE:

1. https://swayam.gov.in/
2. https://onlinecourses.nptel.ac.in/
3. https://nptel.ac.in/courses/108/107/108107114/
4. https://npti.gov.in/flexible-ac-transmission-system

SOLAR POWER BATTERIES
(Professional Elective - V)

IV B.Tech-II Semester **L T P C**
Course Code: A2EE814PE **3 0 0 3**

COURSE OBJECTIVES:

The course should enable the students to:

1. Know different terms of power quality.
2. Illustrate power quality issues for short and long interruptions.
3. Construct study of characterization of voltage sag magnitude and three phase unbalanced
4. Voltage sag.
5. To understand the fundamentals of FACTS Controllers
6. To know the importance of controllable parameters and types of FACTS controllers & their benefits

COURSE OUTCOMES:

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

6. Choose proper controller for the specific application based on system requirements
7. Understand various systems thoroughly and their requirements
8. Know the severity of power quality problems in distribution system;
9. Understand the concept of voltage sag transformation from up-stream (higher voltages) to
10. Down-stream (lower voltage)

UNIT I BASICS OF ELECTRICITY

Voltage, Current, DC Power, AC Power, Energy, Harmonics, Solar Radiation, Net Metering, Measurement of Electrical and Non Electrical Quantities

Solar Photovoltaic

Solar Cell and its function, Solar Technologies, Solar Cell Parameters, Efficiency of Solar Cell, Solar PV Module, Rating of Solar PV Module

UNIT II SOLAR PHOTOVOLTAIC MODULE ARRAY

Connection of PV Module in Series and Parallel, Estimation and Measurement of PV Module Power, Selection of PV Module

UNIT III BATTERIES

Battery function, Types of Batteries, Battery parameters, Selection of Battery, Series Parallel combination of Batteries, Batteries for Photo voltaic System, Application of Batteries in Solar PV system, Battery Maintenance and Measurements, Battery Fault Detection and Test, Battery Installation for PV system.

UNIT IV CHARGE CONTROLLER, MPPT AND INVERTER

Power MOSFET and IGBT, Opto coupler, Buck and Boost Converter, Fly back Converter, Full Bridge Inverter, Voltage and Current Feedback, DC to DC power converter, DC to AC Converter, AC to DC Converter, Battery Charge controller, Maximum Power Point Tracking, Specification of Inverter and charger

UNIT V SOLAR PV SYSTEM DESIGN AND INTEGRATION

Solar Radiation Energy Measurements, Estimating Energy requirement, Types of Solar PV System, Design methodology for SPV system, Design of Off Grid Solar Power Plant, Case studies of 3KWp Off grid Solar PV Power Plant, Design and Development of Solar Street Light and Solar Lantern, Off Grid Solar power Plant.

TEXT BOOK:

1. Off Grid Solar: A practical guide to understanding and installing photovoltaic and battery systems, Old Sequoia Publishing; 2nd edition (18 August 2019)
2. Wind and solar power systems: design, analysis, and operation

REFERENCE BOOKS:

1. Solar Photovoltaic Technology and Systems: A Manual for Technicians,Trainers and Engineers, PHI (30 July 2013)

WEB REFERENCES:

1. https://www.pdfdrive.com/solar-power-books.html
2. https://www.pdfdrive.com/solar-power-diy-handbook-so-you-want-to-connect-your-off-grid-solar-panel-to-a-12-volts-battery-e176345821.html
3. https://www.pdfdrive.com/wind-and-solar-power-systems-design-analysis-and-operation-e3383161.html

E-TEXT BOOKS:

1. https://www.pdfdrive.com/install-your-own-solar-panels-designing-and-installing-a-photovoltaic-system-to-power-your-home-e158463131.html
2. https://www.pdfdrive.com/solar-electric-power-generation-photovoltaic-energy-systems-modeling-of-optical-and-thermal-performance-electrical-yield-energy-balance-effect-on-reduction-of-greenhouse-gas-emissions-e175941508.html

MOOCS COURSES:

1. https://www.pdfdrive.com/wind-and-solar-power-systems-design-analysis-and-operation-e3383161.html

AI TECHNIQUES IN ELECTRICAL ENGINEERING
(Professional Elective - V)

IV B.Tech-II Semester **L T P C**
Course Code: A2EE815PE **3 0 0 3**

COURSE OBJECTIVES:
1. To learn the distinction between optimal reasoning Vs. human like reasoning
2. To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
3. To learn different knowledge representation techniques.
4. To understand the applications of AI, namely game playing, theorem proving, and machine learning.

COURSE OUTCOMES:
1. Ability to formulate an efficient problem space for a problem expressed in natural language.
2. Select a search algorithm for a problem and estimate its time and space complexities.
3. Possess the skill for representing knowledge using the appropriate technique for a given problem.
4. Possess the ability to apply AI techniques to solve problems of game playing, and machine learning.

UNIT – I PROBLEM SOLVING
PROBLEM SOLVING by Search-I: Introduction to AI, Intelligent Agents
ProblemSolvingbySearch–II:Problem-SolvingAgents,SearchingforSolutions,UninformedSearch Strategies:Breadth-firstsearch,Uniformcostsearch,Depth-firstsearch,IterativedeepeningDepth-first search, Bidirectional search, Informed (Heuristic) Search Strategies: Greedy best-first search, A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces, Searching with Non-Deterministic Actions, Searching wih Partial Observations, Online Search Agents and Unknown Environment.

UNIT – II PROBLEM SOLVING BY SEARCH-II
Problem Solving by Search-II and Propositional Logic
Adversarial Search: Games, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-Time Decisions.
Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems.
Propositional Logic: Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.

UNIT – III LOGIC AND KNOWLEDGE REPRESENTATION
First-Order Logic: Representation, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.
Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution
Knowledge Representation: Onto logical Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.

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

UNIT – V UNCERTAIN KNOWLEDGE AND LEARNING

Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use,

Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in BayesianNetworks,RelationalandFirst-OrderProbability,OtherApproachestoUncertainReasoning; Dempster-Shafer theory.

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

TEXT BOOK:

1. Artificial Intelligence A Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.

REFERENCE BOOKS:

1. Artificial Intelligence, 3rd Edn, E.Rich and K.Knight(TMH).
2. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, PearsonEducation.
3. Artificial Intelligence, Shivani Goel, PearsonEducation.
4. Artificial Intelligence and Expert systems – Patterson, PearsonEducation.

WEB REFERENCES:

1. https://walker.cs.grinnell.edu/talks/ai/ai-references.html

E-TEXT BOOKS:

1. https://www.amazon.in/Artificial-Intelligence-Books/b?ie=UTF8&node=4149453031
2. https://bigdata-madesimple.com/20-free-books-to-get-started-with-artificial-intelligence/
3. http://www.freebookcentre.net/CompuScience/Free-Artificial-Intelligence-Books-Download.html

MOOCS COURSES:

1. https://www.my-mooc.com/en/categorie/artificial-intelligence
2. https://www.coursera.org/courses?query=artificial%20intelligence

SMART GRID TECHNOLOGIES

(Professional Elective- VI)

IV B.Tech-II Semester **L T P C**
Course Code: A2EE816PE **3 0 0 3**

COURSE OBJECTIVES

To learn

1. Understand concept of smart grid and its advantages over conventional grid.
2. Know smart metering techniques
3. Learn wide area measurement techniques
4. Understanding the problems associated with integration of distributed generation & its solution through smart grid

COURSE OUTCOMES

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

1. Appreciate the difference between smart grid & conventional grid.
2. Apply smart metering concepts to industrial and commercial installations
3. Formulate solutions in the areas of smart substations, distributed generation and wide area measurements
4. Come up with smart grid solutions using modern communication technologies

UNIT I INTRODUCTION TO SMART GRID

Introduction to Smart Grid, Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Concept of Robust & Self-Healing Grid Present development & International policies in Smart Grid. Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading (AMR), Outage Management System (OMS), Plug in Hybrid Electric Vehicles (PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Smart Substations, Substation Automation, Feeder Automation.

UNIT II GEOGRAPHIC INFORMATION SYSTEM

Geographic Information System(GIS), Intelligent Electronic Devices(IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area Measurement System (WAMS), Phase Measurement Unit(PMU)

UNIT III MICRO-GRID

Concept of micro-grid, need & applications of micro-grid, formation of micro-grid, Issues of interconnection, protection & control of micro-grid, Plastic & Organic solar cells, Thin film solar cells, Variable speed wind generators, fuel-cells, micro-turbines, Captive power plants, Integration of renewable energy sources.

UNIT IV POWER QUALITY ISSUES

Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.

UNIT V APPLICATIONS

Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighborhood Area, Network (NAN), Wide Area Network (WAN), Bluetooth, ZigBee, GPS, Wi-Fi, Wi-Max based communication, Wireless Mesh Network, Basics of CLOUD Computing & Cyber Security for Smart Grid, Broadband over Power line (BPL), IP based protocols.

TEXT BOOKS:

1. Ali Keyhani, “Design of smart power grid renewable energy systems”, Wiley IEEE, 2011.
2. Clark W. Gellings, “The Smart Grid: Enabling Energy Efficiency and Demand Response”, CRC Press , 2009

REFERENCE BOOKS:

1. JanakaEkanayake, Nick Jenkins, KithsiriLiyanage, “Smart Grid: Technology and Applications” Wiley 2012.
2. Stuart Borlase, “Smart Grid: Infrastructure, Technology and solutions “ CRC Press
3. A.G.Phadke, “Synchronized Phasor Measurement and their Applications”, Springer

WEB REFERENCES:

1. http://www.ecerg.com/iesres/data/Presentation_08_04_2016_r1.pdf
2. https://www.energy.gov/sites/prod/files/oeprod/DocumentsandMedia/DOE_SG_Book_Single_Pages%281%29.pdf
3. https://intra.ece.ucr.edu/~hamed/Smart_Grid_Topic_2_Smart_Grid.pdf
4. http://e4uhu.com/down/smart%20grid%20technology/JanakaGrid.pdf

E -TEXT BOOKS:

1. https://www.engineeringbookspdf.com/smart-grid-fundamentals-of-design-and-analysis-by-james-momoh/
2. https://www.springer.com/gp/book/9783662609293
3. https://www.ieee-pes.org/images/files/pdf/2012-pe-smart-grid-compendium.pdf

MOOCS COURSES:

1. https://www.coursera.org/lecture/electric-utilities/5-2-smart-grid-YUPgW
2. https://www.mooc-list.com/tags/smart-grids
3. https://online.stanford.edu/courses/xeiet137-smart-grid-sensing-data-analytics-and-control
4. https://onlinecourses.nptel.ac.in/noc19_ee64/preview

ELECTRICAL DISTRIBUTION SYSTEMS

(Professional Elective- VI)

IV B.Tech-II Semester **L T P C**
Course Code: A2EE817PE **3 0 0 3**

COURSE OBJECTIVES:

The course should enable the students:

1. To distinguish between transmission and distribution systems
2. To understand design considerations of feeders
3. To compute voltage drop and power loss in feeders
4. To understand protection of distribution systems
5. To examine the power factor improvement and voltage control

COURSE OUTCOMES:

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

1. Distinguish between transmission and distribution line and design the feeders
2. Compute power loss and voltage drop of the feeders
3. Design protection of distribution systems
4. Understand the importance of voltage control and power factor improvement

UNIT I GENERAL CONCEPTS, DISTRIBUTION FEEDERS

Introduction to distribution system, Distribution system planning, Factors effecting the Distribution system planning, Load modelling and characteristics. Coincidence factor - contribution factor - Loss factor - Relationship between the load factor and loss factor. Load growth, Classification of loads (Residential, commercial, Agricultural and Industrial) and their characteristics.

Design Considerations of Distribution Feeders: Radial, loop and network types of primary feeders, Introduction to low voltage distribution systems (LVDS) and High voltage distribution systems (HVDS), voltage levels, Factors effecting the feeder voltage level, feeder loading, Application of general circuit constants (A,B,C,D) to radial feeders, basic design practice of the secondary distribution system, secondary banking, secondary network types, secondary mains.

UNIT II SUBSTATIONS, SYSTEM ANALYSIS

Location of Substations: Rating of distribution substation, service area with ‘n’ primary feeders. Benefits derived through optimal location of substations. Optimal location of Substations (Perpendicular bisector rule and X, Y co-ordinate method.

Voltage drop and power-loss calculations: Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines, analysis of non-three phase systems, method to analyze the distribution feeder cost.

UNIT III PROTECTION, COORDINATION

Objectives of distribution system protection, types of common faults and procedure for fault calculations, over current Protective Devices: Principle of operation of Fuses, Auto-Circuit Re closer and Auto-line sectionalizes, and circuit breakers.

Coordination of Protective Devices: Objectives of protection co- ordination, general coordination procedure, Types of protection coordination: Fuse to Fuse, Auto-Re closer to Fuse, Circuit breaker to Fuse, Circuit breaker to Auto-Re closer

UNIT IV COMPENSATION FOR POWER FACTOR IMPROVEMENT

Capacitive compensation for power-factor control - Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched), effect of series capacitors, difference between shunt and series capacitors, Calculation of Power factor correction, capacitor allocation - Economic justification of capacitors - Procedure to determine the best capacitor location.

UNIT V VOLTAGE CONTROL: VOLTAGE CONTROL

Importance of voltage control, methods of voltage control, Equipment for voltage control, effect of shunt capacitors, effect of series capacitors, effect of AVB/AVR on voltage control, line drop compensation, voltagefluctuations.

TEXT BOOKS:

1. Turan Gonen, Electric Power Distribution System Engineering, CRC Press, 3rdEdition2014.
2. V. Kamaraju, Electrical Power Distribution Systems, Tata Mc Graw Hill Publishing Company, 2nd edition,2010.

REFERENCE BOOKS:

1. G. Ram Murthy, Electrical Power Distribution hand book, 2nd edition, University press2004.
2. A.S. Pabla, Electric Power Distribution, Tata McGraw Hill Publishing Company, 6thedition,2013.

WEB REFERENCES:

1. https://onlinelibrary.wiley.com/doi/book/10.1002/9780470943854
2. https://ascelibrary.org/doi/10.1061/%28ASCE%29AE.1943-5568.0000125

E TEXT BOOKS:

1. https://www.amazon.in/Electric-Power-Distribution-Engineering-Turan/dp/1482207001
2. https://ieeexplore.ieee.org/book/5732780

MOOCS COURSE:

1. https://www.classcentral.com/course/swayam-electrical-distribution-system-analysis-14029
2. https://www.classcentral.com/course/electric-power-systems-12053

MACHINE LEARNING APPLICATIONS IN ELECTRICAL ENGINEERING
(Professional Elective- VI)

IV B.Tech-IV Semester **L T P C**
Course Code:A2EE818PE **3 0 0 3**

COURSE OBJECTIVES:
This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
1. To understand computational learning theory.
2. To study the pattern comparison techniques.

COURSE OUTCOMES:
1. Understand the concepts of computational intelligence like machine learning
2. Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
3. Understand the Neural Networks and its usage in machine learning application.

UNIT I
Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias**.**
Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT II
Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.
Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.
Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

UNIT III
Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.
Computational learning theory – Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.
Instance-Based Learning- Introduction, k-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

UNIT IV
Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.
Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.
Reinforcement Learning – Introduction, the learning task, Q–learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

UNIT V

On explanation-based learning, explanation-based learning of search control knowledge.
Analytical Learning-2-Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.
Comb Analytical Learning-1- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks
Inning Inductive and Analytical Learning – Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis.

TEXT BOOKS:

1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOKS:

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

MOOCS COURSE:

1. https://swayam.gov.in/
2. https://onlinecourses.nptel.ac.in/