ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABUS

Effective from the Academic Year 2024-25 onwards

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

MALLA REDDY ENGINEERING COLLEGE (Autonomous)

(An UGC Autonomous Institution, Approved by AICTE and Affiliated to JNTUH, Hyderabad)
Recognized under section 2(f) &12 (B) of UGC Act 1956, Accredited by NAAC with 'A++' Grade (III Cycle)
Maisammaguda, Dhulapally (Post Via Kompally), Secunderabad - 500 100.
www.mrec.ac.in

MALLA REDDY ENGINEERING COLLEGE

MR24 – ACADEMIC REGULATIONS (CBCS)
for B.Tech. (REGULAR) DEGREE PROGRAMME

Applicable for the students of B.Tech. (Regular) programme admitted from the Academic Year ***2024-25*** onwards

The B.Tech. Degree of Jawaharlal Nehru Technological University Hyderabad, Hyderabad shall be conferred on candidates who are admitted to the programme and who fulfill all the requirements for the award of the Degree.

VISION OF THE INSTITUTE
To be a premier center of professional education and research, offering quality programs in a socio-economic and ethical ambience.
MISSION OF THE INSTITUTE
• *To impart knowledge of advanced technologies using state-of-the-art infrastructural facilities.* • *To inculcate innovation and best practices in education, training and research.* • *To meet changing socio-economic needs in an ethical ambiance.*
VISION OF THE DEPARTMENT
To foster quality education, training and research in the field of Electrical and Electronics Engineering and ethically committed engineers to meet the technological needs of the society.
MISSION OF THE DEPARTMENT
• To impart quality education and research to undergraduate and postgraduate students in Electrical and Electronics Engineering. • To produce professionally competent and ethically committed engineers to meet changing socio-economic needs. • To impart knowledge of advanced technologies for continual improvement in teaching, learning and research.

PROGRAMME OUTCOMES (POs)

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Program educational objectives describe the career and professional accomplishments that **programs** are preparing graduates to attain within a few years of graduation.

PEO 1	Graduates will utilize analytical skills, problem solving skills and design skills which are necessary for a successful career in the diverse fields of Electrical and Electronics Engineering.
PEO 2	Graduates will be receptive to new technologies and attain professional competence through lifelong learning such as post graduate programmes, research, publications and other professional activities.
PEO 3	Graduates will possess excellent communication, team work skills, leadership qualities, along with good professional and ethical attitude.

PROGRAM SPECIFIC OUTCOMES (PSOs)

Program Specific Outcomes are what the students should be able to do at the time of graduation.

PSO1	Apply fundamental knowledge to identify, formulate, design and investigate various problems of electrical and electronic circuits, power electronics, power systems and renewable energy systems for specific requirements.
PSO2	Demonstrate proficiency in use of modern software tools & hardware to engage in life-long learning and to successfully adapt in multi-disciplinary environments.
PSO3	Solve ethically and professionally various Electrical Engineering problems in societal and environmental context and communicate effectively.

1. **Malla Reddy Engineering College (Autonomous)** offers **Four** Years (**Eight** Semesters) **Bachelor of Technology** (**B.Tech**.) with Choice Based Credit System (CBCS) in the following Branches of Engineering with effect from the academic year **2024-25**.

S. No.	Branch Code	Branch	Intake
1	01	Civil Engineering (CE)	30
2	02	Electrical and Electronics Engineering (EEE)	60
3	03	Mechanical Engineering (ME)	30
4	04	Electronics and Communication Engineering (ECE)	180
5	05	Computer Science and Engineering (CSE)	480
6	12	Information Technology (IT)	180
7	67	Computer Science and Engineering (Data Science)	240
8	66	Computer Science and Engineering (AI &ML)	240

2. Eligibility for Admission

2.1 Admission to the B.Tech programme shall be made either on the basis of the merit rank obtained by the qualifying candidate in entrance test conducted by the Telangana State Government (TSEAMCET) or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the Government of Telangana from time to time.

2.2 The medium of instructions for the entire B.Tech programme will be **English** only.

3. B.Tech. Programme Structure & Duration of Study

3.1 A student after securing admission shall pursue the B.Tech programme in a minimum period of **four** academic years (8 semesters) and a maximum period of **eight** academic years (16 semesters) starting from the date of commencement of first year first semester. Further 2 years of extension is allowed for appearing examinations, failing which student shall forfeit seat in B.Tech. Course. The total credits for the entire B.Tech. programme is 160 as prescribed by AICTE. Each student shall secure 160 credits (with CGPA $\geq$ 5) required for the completion of the B.Tech programme and award of the B.Tech. degree*.

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

3.2.1 Semester Scheme:

Each B.Tech programme is of 4 academic years (8 Semesters), with the academic year being divided into two semesters of 22 weeks (≥90 instructional days) each, having **'Continuous Internal Evaluation (CIE)'** and **'Semester End Examination (SEE)'** under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC. The Curriculum/ Course Structure is defined based on the model curriculum defined by AICTE.

3.2.2 Credit Courses:

All Subjects/ 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) courses or Tutorials (T).
- One Credit - for two hours/ Week/ Semester for Laboratory/ Practical's (P) courses.

Courses like Environmental Sciences, Induction Programme, Constitution of India, Intellectual Property Rights, Gender Sensitization and students' activities like Internship are identified as Mandatory/Audit courses. These courses will not carry any credits.

3.2.3 Subject/ Course Classification:

All subjects/ courses offered for the B.Tech. Programmes are broadly classified as follows.

(a) Foundation Courses (FC)
(b) Core Courses (CC)
(c) Elective Courses (EC)
(d) Mandatory Courses (MC)
(e) Audit Courses (AC)

S. No.	Broad Course Classification	Course Group/ Category	Course Description
1	Foundation Courses (FC)	BS – Basic Sciences	Includes Mathematics, Physics and Chemistry subjects
2		ES - Engineering Sciences	Includes Fundamental Engineering Subjects
3		HS – Humanities and Social Sciences	Includes subjects related to Humanities, Social Sciences and Management
4	Core Courses (CC)	PC – Professional Core	Includes core subjects related to the parent discipline/ department/ branch of Engineering.
5	Elective Courses (EC)	PE – Professional Electives	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.
6		OE – Open Electives	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering.
7	Core Courses	Project Work	B.Tech. Project or UG Project or UG Major Project or Project Stage I & II
8		Industry Training/ Internship/ Industry Oriented Mini-project/ Mini-Project/ Skill Development Courses	Industry Training/ Internship/ Industry Oriented Mini-Project/ Mini-Project/ Skill Development Courses
9		Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch of Engineering.
10	Minor Courses	-	1 or 2 Credit Courses (subset of HS)
11	Mandatory Courses (MC)	-	Mandatory Courses (non-credit)

3.2.4 Course Nomenclature:

The curriculum nomenclature or course structure grouping for each of the B.Tech. Programmes, is as listed below (along with AICTE specified range of total credits).

S. No.	Broad Course Classification	Course Group or Category	Course Description	Total Credits
1	Foundation Courses	Humanities, Social sciences & Management (HSM)	English, humanities, social sciences, management	12
		Basic Sciences (BS)	Mathematics, Physics, Chemistry.	23
		Engineering Sciences (ES)	Fundamental Engineering Courses	22
2	Core Courses and Core activities	Program Core (PC)	Professional courses-core relevant to the discipline	57
		Project work (PW)	Minor & Major project (Institute / Industry), Internship (Industry/ research organization), Seminar.	16
3	Elective Courses	Program Electives (PE)	Professional courses-electives relevant to the discipline	18
		Open Electives (OE)	Electives from other departments and or emerging areas	12
4	Mandatory Courses	Mandatory Courses (MC)	Courses on Environmental Science and Rural Sensitization, Gender Sensitization, Constitution of India, Intellectual Property Rights	No Credits
Total Credits				160

4.1 Course Registration

4.2 A 'Faculty Advisor or Counselor' shall be assigned a group of 20 students, who will advise the students on the Under Graduate Programme (UGP), its Course Structure and Curriculum, Choice / Option for Subjects / Courses, based on his competence, progress, pre-requisites and interest.

4.3 Academic section of the College invites 'Registration Forms' from students within 15 days from the commencement of class work for the semester.

4.4 If the student submits ambiguous choices or multiple options or erroneous entries during registration for the Subject(s) / Course(s) under a given specified Course / Group / Category as listed in the course structure, only the first mentioned Subject / Course in that category will be taken into consideration.

4.5 Subject/ course options exercised through on-line registration are final and cannot be changed or inter-changed; further, alternate choices also will not be considered. However, if the subject/ course that has already been listed for registration by the Head of the Department in a semester could not be offered due to any inevitable 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). Such alternate arrangements will be made by the Head of the Department, with due notification and time-framed schedule, within a week after the commencement of class-work for that semester.

4.5 Dropping of subjects/ courses may be permitted, only after obtaining prior approval from the faculty advisor/ counselor 'within a period of 15 days' from the beginning of the current semester.

4.6 **Open Electives**: 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.

4.7 **Professional Electives**: The students have to choose six Professional Electives (PE-I to VI) from the list of professional electives given.

4.8 For Audit Courses a **'Satisfactory Participation Certificate**' from the authorities concerned for the relevant semester is essential. No Marks or Credits shall be awarded for these activities.

4.9 For Mandatory Courses, a '**Satisfactory / Not Satisfactory' is** awarded based on the performance in Continuous Internal Evaluation (CIE).

5.1 Elective Subjects/ Courses to be offered

5.2 An Elective Subject/ Course may be offered to the students, ONLY IF a minimum of 40 students opt for the same. The maximum strength of a section is limited to75.

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

5.4 In case of options coming from students of other departments/ branches/ disciplines (not considering **open electives**), first **priority** shall be given to the student of the '**parent department**'.

6.1 Attendance Requirements:

6.2 A student shall be eligible to appear for the Semester End Examinations, if he / she acquire a minimum of 75% of attendance in aggregate of all the Subjects/ Courses (including Non-Credit Courses) for that semester. **Two periods** of attendance for

each theory subject shall be considered, if the student appears for the mid-term examination of that subject.

6.3 Condoning of shortage of attendance in aggregate up to 10% (>= 65% and< 75%) in each semester may be granted by the Academic Cell on genuine and **valid grounds** based on the student's representation with supporting evidence.

6.4 A stipulated fee prescribed by the College Academic Committee (CAC), shall be payable towards condoning of shortage of attendance.

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

6.6 Students whose attendance is < 65% are not eligible to register for Semester End Examinations, they get detained and their registration for that semester shall stand cancelled including all academic credentials (internal marks etc.) of that semester. They will not be promoted to the next semester. They may seek re-registration for all those Subjects registered in that Semester in which he got detained, by seeking re-admission for that semester as and when offered; in case if there are any Professional Electives and/ or Open Electives, the same may also be **re-registered** if offered, however, if those electives are not offered in later semesters, then alternate electives may be chosen from the **same** set of elective subjects offered under that category.

6.7 If any student fulfills the attendance requirement in the present semester shall not be eligible for readmission into the same semester.

7.1 Academic Requirements:

The following Academic Requirements have to be satisfied, in addition to the attendance requirements mentioned in item No.6.

7.2 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 Continuous Internal Evaluation (CIE), not less than 35% (21 marks out of 60 marks) in the semester end examinations (SEE), 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 'P' Grade or above in that Subject/ Course. If the student secured 'F' grade in any subject he/she can apply for recounting / revaluation by paying prescribed fee. If the student is not satisfied after the results declaration of recounting / revaluation he/she can apply for challenge valuation with the prescribed fee. College appoints a faculty member; student can bring another faculty member who taught the respective subject at least once (proof should be provided). The faculty member should be from any autonomous college affiliated to JNTUH or JNTUH constituent colleges.

7.3 A student shall be deemed to have satisfied the Academic Requirements and earned the credits allotted to to Real-time Research Project (or) Field Based Research Project (or) Industry Oriented Mini Project (or) Internship (or) Seminar, if he/ she secure not less than 40% marks (i.e 40 out of 100 allotted marks) in each of them. The student would be treated as failed, if he/ she :

(i) does not submit a report on his/ her Mini Project / Seminar / Project or does not make a presentation of the same before the Evaluation Committee as per schedule or (ii) secures less than 40% of marks in Mini Project/ Seminar/ Project evaluations.

He/ She may reappear once for each of the above evaluations, when they are scheduled again; if he/ she fails in such **'one-reappearance'** evaluation also, he/ she has to reappear for the same in the next subsequent semester, as and when it is scheduled.

7.4 Promotion Rules: Every student has to fulfil the Attendance and Academic requirements by securing the required credits against registered credits as shown below:

S. No.	Promotion	Conditions to be fulfilled
1.	First year first semester (I Semester) to first year second semester (II Semester)	• Regular course of study of first year first semester. (I Semester)
2.	First year second semester (II Semester) to second year first semester (III Semester)	• Regular course of study of first year second semester (II Semester). • Must have secured at least 50% credits up to first year second semester (II Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3.	Second year first semester (III Semester) to second year second semester (IV Semester)	• Regular course of study of second year first semester (III Semester)
4.	Second year second semester (IV Semester) to third year first semester (V Semester)	• Regular course of study of second year second semester (IV Semester). • Must have secured at least 60% credits up to second year second semester (IV Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5.	Third year first semester (V Semester) to third year second semester (VI Semester)	• Regular course of study of third year first semester (V Semester).

6.	Third year second semester (VI Semester) to fourth year first semester (VII Semester)	• Regular course of study of third year second semester (VI Semester). • Must have secured at least 60% credits up to third year second semester (VI Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7.	Fourth year first semester (VII Semester) to fourth year second semester (VIII Semester)	• Regular course of study of fourth year first semester (VII Semester).

7.5 A Student shall register for all subjects covering 160 credits as specified and listed (with the relevant Course/ Subject Classifications as mentioned) in the Course Structure, fulfils all the Attendance and Academic requirements for 160 credits securing a minimum of 'P' Grade (Pass Grade) or above in each subject and earn 160 credits securing SGPA $\geq$ 5.0 (in each semester) and CGPA (at the end of each successive semester) $\geq$ 5.0, to successfully complete the B.Tech Programme (including all mandatory courses). The performance of the student in these 160 credits shall be considered for the calculation of the final CGPA (**at the end of undergraduate programme**), and shall be indicated in the grade card / marks memo of IV-year II semester.

7.6 If a student registers for some more **'Extra Subjects'** (in the parent Department or other Departments/ Branches of Engineering) other than those listed subjects totaling to 160 credits as specified in the Course Structure of his/ her department, the performances in those 'extra Subjects' (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 subjects registered, 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 No.6 and 7.1 to7.4.

7.7 A student eligible to appear in the Semester End Examination in any Subject/ Course, but absent from it or failed (thereby failing to secure 'P' Grade or above) may reappear for that Subject/ Course at the supplementary examination as and when conducted. In such cases, his / her Internal Marks (CIE) assessed earlier for that Subject/ Course will be carried over and added to the marks to be obtained in the SEE supplementary examination, for evaluating his/ her performance in that subject.

7.8 When a student is detained due to shortage of attendance in any semester, he/ she may be re-admitted when the same semester is offered in the next academic year for fulfillment of academic requirements. The academic regulations under which student has been readmitted shall be applicable. However, no Grade Allotments or SGPA/ CGPA calculations will be done for that entire semester in which he/ she got detained.

7.9 When a student is detained due to lack of credits in any year, shall be promoted to the next academic year only after acquiring the required academic credits. The

academic regulations under which student has been readmitted shall be applicable to him.

8.0 Evaluation, Distribution and Weightage of Marks

8.1.1 The performance of a student in each semester shall be evaluated subject - wise (irrespective of credits assigned) for 100 marks for Theory, Practicals, Seminar, Drawing / Design, Mini Project, Project and Minor Courses etc. The Theory / Practical courses are evaluated with two components.

1. Continuous Internal Evaluation (CIE),
2. Semester End Examination (SEE).

The distribution of 40 Marks for CIE and 60 Marks for SEE.

8.2 Theory Courses:

8.2.1 Continuous Internal Evaluation (CIE):

The performance of a student in every subject/course (including practicals and Project) will be evaluated for 100 marks each, with 40 marks allotted for CIE (Continuous Internal Evaluation) and 60 marks for SEE (Semester End-Examination)

In CIE, for theory subjects, during a semester, there shall be two mid-term examinations. Each Mid-Term examination consists of two parts i) Part – A for 10 marks, ii) Part – B for 20 marks with a total duration of 2 hours as follows:

1. Mid Term Examination for 30 marks:
   a. Part - A : Objective/quiz paper for 10 marks.
   b. Part - B : Descriptive paper for 20 marks.

Mid - Term Examination – UG				
Part	Type of Questions	No. of Questions	Marks per Question	Total
Part - A	Multiple – Choice Questions	20	0.5	10
Part - B	Internal choice questions (Module-wise)	5	4	20
Mid Term Exam Total				**30**

The average of the two Mid Term Examinations shall be taken as the final marks for Mid Term Examination (for 30 marks).

The remaining 10 marks of Continuous Internal Evaluation are distributed as:

2. Assignment for 5 marks. (Average of 2 Assignments each for 5 marks)
3. Subject Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the concerned subject for 5 marks.

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. First Assignment should be submitted before the conduct of the first mid-term examinations, and the Second Assignment should be submitted before the conduct of the second midterm examinations. 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 subject concerned for 5 marks before II Mid-Term Examination.

The weightage for the midterm examination shall be given as average of both mid-term examinations. The student shall appear for both midterm examinations, in case of any specific reason the student appears only one midterm examination, 50% weightage of that examination shall be considered.

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 Over all 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.

A student who has failed to secure 35% of CIE marks in a subject, 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.

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 Viva- voce/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.

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.

8.2.2 Semester End Examination (SEE):

Semester End Examination (SEE) shall be conducted for all courses of B.Tech Programmes at the end of the Semester. Duration of the examination is 3 hours. The paper setting and evaluation of all courses carried out by external examiners. The examiners will be selected by the Chief Controller of Examinations/Principal, from the panel of examiners submitted by the head of the respective department.

Semester End Examination - UG				
Part	**Type of Questions**	**No. of Questions**	**Marks per Question**	**Total**
Part-A	Compulsory question which consists of ten sub-questions from all modules	10	1	10
Part-B	Internal choice questions (Module-wise)	5	10	50
Total				**60**

8.3 Practical Courses:

8.3.1 Continuous Internal Evaluation (CIE):

8.3.2 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.

8.3.3 Semester End Examination (SEE):

The Semester End Examination shall be conducted with an external examiner and the Internal Examiner. External examiner will be appointed by the Chief Controller of Examinations/Principal of the college. The external examiner should be selected from the outside college among the autonomous/reputed institutions from a panel of three examiners submitted by the concerned Head of the Department.

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 and
5. 10 marks for viva-voce on concerned laboratory course.

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 Over all 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

8.4 Engineering Drawing :

For Drawing subjects there shall be a Continuous Internal Evaluation (CIE) during the semester for 40 marks and 60 marks for semester end examination.

The distribution of marks for CIE is given below

CIE for Engineering Drawing/ Engineering Graphics				
Part	**Type of Questions**	**No. of Questions**	**Marks per Question**	**Total**
Part - A	Day – to – Day Work			10
Mid – Term Examination				
Part - B	Internal choice questions (Module-wise)	5	6	30
Total				40

The average of the two Mid Term Examinations shall be taken as the final marks for Mid Term Examination (for 40 marks).

The distribution of marks for SEE is given below

Semester End Examination - Engineering Drawing/ Engineering Graphics				
Part	**Type of Questions**	**No. of Questions**	**Marks per Question**	**Total**
Part-A	compulsory question which consists of ten sub-questions from all modules	10	1	10
Part-B	Internal choice questions (Module-wise)	5	10	50
Total				**60**

Machine Drawing:

For Drawing subjects there shall be a Continuous Internal Evaluation (CIE) during the semester for 40 marks and 60 marks for semester end examination.

The distribution of marks for **CIE** is given below

CIE for Machine Drawing			
Type of Questions	**No. of Questions**	**Marks per Question**	**Total**
Day to Day Work			10
I Mid Term Examination			
Part Drawing (4 out of 6)	4	7.5	30
Total			40

CIE for Machine Drawing			
Type of Questions	**No. of Questions**	**Marks per Question**	**Total**
Day to Day Work			10
II Mid Term Examination			
Assembly Drawing (1 out of 2)	1	30	30
Total			40

The average of the two Mid Term Examinations shall be taken as the final marks for Mid Term Examination (for 40 marks).

The distribution of marks for **SEE** is given below

SEE for Machine Drawing			
Type of Questions	**No. of Questions**	**Marks per Question**	**Total**
Part A (2 out of 4)	Part Drawing	10	20
Part B - (Compulsory Question)	Assembly Drawing	40	40
Total			60

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

II Year II Semester Real-Time (or) Field-based Research Project course: The internal evaluation is for 100 marks and it shall take place during I Mid-Term examination and II Mid-Term examination. The total marks of two Mid-Term examinations is the final for 100 marks. Student shall have to earn 40%, i.e 40 marks out of 100 marks from 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.

8.5 Projects:

8.5.1 Internship/Mini Project:

There shall be an 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 I-Year II Semester, 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.

Project:
UG project work shall be carried out in two stages: Project Stage – I for approval of project before Mid-II examinations in IV Year I Semester and Project Stage – II during IV Year II Semester. Student has to submit project work report at the end of IV Year II Semester. The project shall be evaluated for 100 marks before commencement of SEE Theory examinations.

For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall approve the project work to begin before II Mid-Term examination of IV Year I Semester. The student is deemed to be not eligible to register for the Project work, if he 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.

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.

For Project Stage – II, the external examiner shall evaluate the project work for 60 marks and the internal project committee shall evaluate it for 40 marks. Out of 40 internal marks, the departmental committee consisting of Head of the Department, Project Supervisor and a Senior Faculty Member shall evaluate the project work for 20 marks and Project Supervisor shall evaluate for 20 marks. The topics for Industry Oriented Mini Project/ Internship/SDC etc. and the main Project shall be different from the topic already taken. 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 External Examiner as per schedule, or (iii) secures less than 40% marks in the sum total of the CIE and SEE taken together.

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

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

8.6.3 Seminar:
For Seminar presentation, the student shall collect the information on a specialized topic, prepare a report and submit to the department at the time of seminar presentation. The seminar presentation (along with the report) shall be evaluated by a committee consisting of Seminar coordinator and two senior faculty members with appropriate grade. The

seminar report shall be evaluated internally for 100 marks. There shall be no semester end examination for the seminar.

8.6 Non-Credit Courses:

8.7.1 Mandatory Courses:

For mandatory courses of Environmental Science, Constitution of India, Intellectual Property Rights, and Gender Sensitization lab, a student has to secure 40 marks out of 100 marks (i.e. 40% of the 100 marks allotted) in the Continuous Internal Evaluation for passing the subject/course. Two internal exams shall be conducted and evaluated for 50 marks. The student has to secure minimum 40% of the marks in each internal exam as per 8.3.2. These marks should also be uploaded along with the internal marks of other subjects.

No marks or letter grades shall be allotted for mandatory/non-credit courses. Only Pass/Fail shall be indicated in Grade Card.

8.7.2 Audit Courses:

For Audit Courses offered in any Semester, the student must submit a '**Participation Certificate**' from the concerned authorities. Internship program is also conducted under the category of Audit Courses. The student needs to submit a detailed report to the department after internship program. No marks or Letter Grade shall be allotted for these activities.

8.7.3 Acceleration of course work of final semester

In order to allow the bright and motivated students, a provision is made to complete the final semester three open elective subjects (I, II and III) in advance. These subjects are offered through during III-Year II Semester (OE-I), IV-Year I Semester (OE-II) and IV year II Semester (OE-III) and credit transfer is permitted. These credits are shown in the Final Semester Grade card in order to calculate SGPA and CGPA.

This provision is made to allow the students for industry internship or to undertake projects in industry in the final semester. A student at the end of the II-Year II Semester having a CGPA of $\geq$ 7.0 without any backlogs is eligible to register for OE-I in Third Year Second semester. In the same way to register for OE-II and OE-III the student has to secure a CGPA of $\geq$ 7.0 at the end of the III- Year I Semester and III-Year II Semester respectively.

Departments will notify at the time of registration about the minimum and the maximum number of students to be enrolled for a particular open elective to be offered.

The list of open electives offered during that semester will be notified by the departments at the time of course work registration.

8.7.4 Massive Open Online Courses

8.7.4.1 To meet the global requirements by providing greater flexibility to choose a variety of courses to inculcate the habit of self-learning, in compliance with the UGC guidelines, Massive Open Online Courses (MOOCs) shall be provided during the period of study.

8.7.4.2 The students are allowed to register MOOCs courses up to a maximum of 15% of total credits under professional electives courses, subjected to the approval by the concerned Head of the Department. The proposed MOOCs would be additional choices in the program elective/open elective group of courses subject to their offering by the department as well as their availability in MOOCs platform during the respective semester. However, the Board of studies of the respective department shall approve contemporary courses from time to time under MOOCs.

8.7.4.3 Concerned departments shall declare the list of the courses that a student can pursue at the beginning of the semester. Students interested in pursuing MOOCs shall register the course at their department at the beginning of the semester against the courses that are announced by the department. Course progress shall be monitored by the course coordinator of the department. Each of the course shell be of minimum 12 weeks in duration.

8.7.4.4 The Students registered for MOOC Courses shall be Evaluated for CIE as per 8.2.1. The SEE evaluation will be considered as per 8.2.2. If the students fails to clear the subject, he/she has to re- register for the course.

8.7.4.5 The grade equivalency for MOOCs courses shall be recommended by the respective BOS chairperson and is to be approved by the Chairman, academic council.

9.1 Grading Procedure

9.2 Grades will be awarded to indicate the performance of each student in each Theory Subject, Laboratory/Practicals/ Industry-Oriented Mini Project/Internship/SDC (Skill Development Center) and Project Stage, based on the % of marks obtained in CIE + SEE both taken together as specified in Item No. 8 and a corresponding Letter Grade shall be given.

9.3 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	Grade Points	Letter Grade
≥90	10	(Out Standing)
≥80 to < 90	9	A^+ (Excellent)
≥70 to < 80	8	A (Very Good)
≥60 to < 70	7	B^+ (Good)
≥50 to <60	6	B (Average)
≥40 to < 50	5	C (Pass)
< 40	0	F (Fail)
Absent	0	Ab

9.4 A student obtaining **'F'** Grade in any subject shall be considered '**Failed'** and will be required to reappear as 'Supplementary Candidate' in the Semester End Examination (SEE) as and when conducted. In such cases, his / her Internal Marks (CIE Marks) in those subject(s) will remain same as those he / she obtained earlier.

9.5 A Letter Grade does not imply any specific % of marks.

9.6 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 /

she has to repeat all the Subjects/ Courses pertaining to that semester, when he / she is detained (as listed in Items Nos.7.7 &7.8).

9.7 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

9.8 The Student passes the Subject/ Course only when he / she gets GP ≥ 5('C' Grade or above).

9.9 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

$= \sum \quad / \sum$ **… for each semester**

where 'i' is the subject indicator index (takes into account all subjects in a semester), 'N' is the number of subjects registered for the semester (as specifically required and listed under the Course Structure of the parent department) is the number of credits allotted to the i^{th}subject and represents the Grade Points (GP)corresponding to the Letter Grade awarded for that i^{th}subject.

9.10 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 II semester onwards, at the end of each semester, as per the formula.

$= \sum \quad / \sum$ **… for all 'S' semesters registered**

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

where 'M' is the total number of subjects (as specifically required and listed under the course structure of the parent department) the student has registered from the 1^{st}semester onwards up to and inclusive of the semester 'S' (obviously M > N), 'j' is the subject indicator index (takes in to account all subjects from '1' to 'S' semesters) is the number of credits allotted to the j^{th}subject, and represents the Grade Points (GP) corresponding to the Letter Grade awarded for that j^{th}subject. After registration and completion of I Year I Semester however, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

ILLUSTRATION OF CALCULATION OF SGPA

Course/ Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	3	A	8	3 x 8 = 24
Course 2	3	O	10	3 x 10 = 30
Course 3	3	C	5	3 x 5 = 15
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	1.5	B	6	1.5 x 6 = 09
Course 7	1.5	A	8	1.5 x 8 = 12
Course 8	2	A	8	2 x 8 = 16
	Total = 20			Total Credit Points = 151

SGPA = 151/20 = 7.55

ILLUSTRATION OF CALCULATION OF CGPA:

Semester	Credits	SGPA	Credits X SGPA
Semester I	21	7	21 X 7 = 147
Semester II	19	6	19 X 6 = 114
Semester III	22	6.5	22 X 6.5 = 143
Semester IV	20	6	20 X6 = 120
Semester V	22	5.75	22 X 5.75 = 126.5
Semester VI	18	7.25	18 X 7.25 = 130.5
Semester VII	18	8	18 X 8 = 144
Semester VIII	20	8.5	20 X 8.5 = 170
	160		1095

CGPA = 1095/160 = 6.84

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

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

9.12 For calculations listed in Item Nos.9.6 to 9.10, 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.

9.13 Passing Standards:

9.13.2 A student shall be declared successful or 'passed' in a semester, only when he / she gets a SGPA ≥ 5.00 (at the end of that particular semester); and a student shall be declared successful or 'passed' in the entire B.Tech Programme, only when he / she gets a CGPA ≥ 5.00; subject to the condition that he / she secures a GP ≥ 5 ('C' Grade or above) in every registered Subject/ Course in each semester (during the entire B.Tech Programme) for the award of degree, as required.

9.13.3 After the completion of each semester, a grade card or grade sheet shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (course code, title, no. of credits, grade earned, etc.) and credits earned. **There is NO exemption of credits in any case.**

9.13.4 In spite of securing 'P' Grade or above in some (or all)Subjects/ Courses in any semester, if a student receives a SGPA < 5.00 and/ or CGPA < 5.00 at the end of such a semester, then he / she 'may be allowed' (on the 'specific recommendations' of the Head of the Department and subsequent approval from the Principal) (i) to go into the next subsequent semester (subject to fulfilling all other attendance and academic requirements as listed under Item Nos. 7&8);(ii) to 'improve his / her SGPA of such a semester (and hence CGPA) to 5.00 or above', by reappearing for one or more (as per student's choice) of the same course(s) in

which he / she has secured 'P' Grade(s) in that semester, at the Supplementary Examinations to be held in the next subsequent semester(s). In such cases, his / her Internal Marks (CIE Marks) in those subject(s) will remain same as those he / she obtained earlier. In these considerations, the newly secured Letter Grades will be recorded and taken into account for calculation of SGPA and CGPA, only if there is an improvement.

9.13.5 After the completion of each semester, a Grade Card or Grade Sheet (or Transcript) shall be issued to all the registered students of that semester, indicating the Letter Grades and credits earned. It will show the details of the courses registered (Course Code, Title, No. of Credits and Grade Earned etc.), Credits earned, SGPA and CGPA.

10 Declaration of Results

10.1 Computation of SGPA and CGPA are done using the procedure listed in items 9.6 to 9.12.

10.2 For final % of marks equivalent to the computed final CGPA, the following formula may be used …

% of Marks = (final CGPA – 0.5) x 10

11 Award of Degree

11.1 A student who register for all the specified courses as listed in the Course Structure, satisfies all the course requirements, passes all the examinations prescribed in the entire B.Tech Programme within the specified period (refer 4.1) and secures the required 160 Credits (with CGPA ≥ 5.0) shall be declared to have '**Qualified'** for the award of the B.Tech. Degree in the chosen branch of engineering as selected at the time of admission.

11.2 A student who qualifies for the award of the degree as listed in Item 11.1, shall be placed in one of the following classes:

Class Awarded	CGPA
First Class with Distinction	≥ 8.00
First Class	≥ 7.0 and < 8.00
Second Class	≥ 6. 0 and < 7.0
Pass Class	≥ 5.00 and < 6.0

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

11.4 Students will be eligible for the award of '**Gold Medal**', if he/she should have passed all the subjects/courses in first appearance within the first academic years (or eight sequential semesters) from the date of commencement of first year first semester and should have secure CGPA ≥ 8.00 at the end of eight sequential semesters.

11.5 A student will be eligible to get under graduate with honours or additional minor engineering if he/she completes an additional 20 credits through MOOCs.

AWARD OF 2-YEAR B.TECH. DIPLOMA CERTIFICATE

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) upto B.Tech. II Year II Semester, if the student want to exit the 4-Year B.Tech. program and *requests for the 2 -Year* B. Tech. (*UG) Diploma Certificate.*

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 classwork for that semester.*

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.*

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).

12 Withholding of Results

If the student has not paid fees to college at any stage or has pending dues against his / her name due to any reason whatsoever or if any case of indiscipline is pending against him, the result of the student may be with-held and he / she 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.

13 Transitory Regulations

A. **For students detained due to shortage of attendance**:

1. A student who has been detained in I year of MR18/MR20/MR21 regulations due to lack of attendance, shall be permitted to join I year I Semester of MR22 regulations and he / she 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 MR18 /MR20 /MR21 regulations for want of attendance, shall be permitted to join the corresponding semester of MR22 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 MR22 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**:

1 A student of MR18/MR 20/MR21 regulations, who has been detained due to lack of credits, shall be promoted to the next semester of MR22 regulations only after acquiring the required credits as per the corresponding regulations of his/her first admission. The student is required to complete the B.Tech Programme within the stipulated period of eight academic years from the year of first admission. The MR22 academic regulations are applicable to a student from the year of readmission onwards. See rule (C) for further Transitory Regulations.

C. **For readmitted students in MR22 regulations**:

1 A student who has failed in any subject under any regulation has to pass those subjects in the same regulations.

2 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 MR22 regulations. **There is NO exemption of credits in any case**. The performance evaluation of the student will be done after the exemption of two subjects if total credits acquired are ≤ 160, (see item 7.5).

3 If a student readmitted to MR22 regulations, has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in MR22 regulations will be substituted by another subject to be suggested by the College Academic Committee (CAC).

Note: If a student readmitted to MR22 regulations, has not studied any subjects/topics in his/her earlier regulations of study which is prerequisite for further subjects in MR22 regulations, the departments concerned shall conduct remedial classes to cover those subjects/topics for the benefit of the students.

14 Student Transfers

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

14.2 The students seeking transfer to MALLA REDDY ENGINEERING COLLEGE (Autonomous)-MREC(A) from various other Universities/ Institutions have to pass the failed subjects which are equivalent to the subjects of MREC(A) and also pass the subjects of MREC(A) 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 MREC(A), the students have to study those subjects in MREC(A) inspite of the fact that those subjects are repeated.

14.3 The transfer students from other Universities / Institutions to MREC(A) who are on rolls will be provided one chance to write internal examinations in the failed subjects and/or subjects not studied as per the clearance letter issued by the JNTUH.

14.4 The autonomous affiliated colleges have to provide one chance to write the internal examinations in the **equivalent subject(s)** to the students transferred from other universities/institutions to JNTUH autonomous affiliated colleges who are on rolls, as per the clearance (equivalence) letter issued by the University.

15. Transitory Regulations

A. For students detained due to shortage of attendance:

1. A Student who has been detained in I year of MR20 Regulations due to lack of attendance, shall be permitted to join I year I Semester of MR22 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 MR20 regulations for want of attendance, shall be permitted to join the corresponding semester of MR22 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 MR22 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 MR20 Regulations who has been detained due to lack of credits, shall be promoted to the next semester of MR22 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 MR20 & MR22 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 MR22 Academic Regulations are applicable to a student from the year of readmission. See rule (C) for further Transitory Regulations.

C. For readmitted students in MR22 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 MR22 Regulations. **There is NO exemption of credits in any case**.

6. If a student is readmitted to MR22 Regulations and has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in MR22 Regulations will be substituted by another subject to be suggested by the college academic administration.

Note:

If a student readmitted to MR22 Regulations and has not studied any courses/topics in his/her earlier regulations of study which is prerequisite for further subjects in MR22 Regulations, then the college shall conduct remedial classes to cover those courses/topics for the benefit of the students.

16. Transfer of students from the Constituent Colleges of JNTUH or from other Colleges / Universities:

a) Transfer of students from the Constituent Colleges of JNTUH or from other Colleges/ Universities shall be considered only on case-to-case basis.

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

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

d) The transferred students from other Universities/institutions to MREC who are on rolls are to be provided one chance to write the CBT (internal marks) in the **equivalent course(s)** as per the clearance (equivalence) letter issued by the University.

17. General Rules

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

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

c) In case of any error in the above rules and regulations, the decision of the Academic Council is final.

d) The college may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

18. Scope

(i) Where the words "he", "him", "his", occur in the write – up of regulations, they include "she", "her", "hers".

(ii) Where the words "Subject" or "Subjects", occur in these regulations, they also imply "Course" or "Courses".

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

(iv) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the College Academic Committee headed by the Principalwill be considered as final.

Academic Regulations for B.Tech.(Lateral Entry Scheme) w.e.f the A Y 2023-24

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

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

2. The student shall register for 120 credits and secure 120 credits with CGPA ≥ 5 from II year to IVyear B.Tech. Programme (LES) for the award of B.Tech. degree.

3. The students, who fail to fulfill the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech. Programme.

4. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech.(LES).

5. **Promotion Rule:**

Sl.No.	Promotion	Conditions to be fulfilled
1	Second year first semester (III Semester) to second year second semester (IV Semester)	Regular course of study of second year first semester (III Semester).
2	Second year second semester (IV Semester) to third year first semester (V Semester).	**(i)** Regular course of study of second year second semester (IV Semester) **(ii)** Must have secured at least 60% credits up to second year second semester (IV Semester) from all the relevant regular and supplementary examinations, whether the
3	Third year first semester (V Semester) to third year second semester (VI Semester)	Regular course of study of third year first semester (V Semester).
4	Third year second semester (VI Semester) to fourth year first semester (VII Semester)	**(i)** Regular course of study of third year second semester (VI Semester) **(ii)** Must have secured at least 60% credits up to third year second semester (VI Semester) from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester (VII Semester) to fourth year second semester (VIII Semester)	Regular course of study of fourth year first semester (VII Semester)

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

7. LES students are not eligible for 2-Year B. Tech. Diploma Certificate.

MALPRACTICES RULES

DISCIPLINARY ACTION FOR IMPROPER CONDUCT IN EXAMINATIONS

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

		the courses of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all SEE. The continuation of the programme 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 course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The student is also debarred for two consecutive semesters from class work and all SEE. The continuation of the programme by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
6	Refuses to obey the orders of the Chief Controller of Examinations (CCE) / Controller of Examinations (CE) / Assistant Controller of Examinations (ACE) / 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	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over

	threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-incharge, 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	to the police and a police cases 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 course and all the other courses the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all SEE. The continuation of the programme by the student is subject to the academic regulations in connection with forfeiture of seat.
8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also

		debarred and forfeits the seat.
9	If student of the college, who is not a student for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. 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 course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that course and all other courses the student has appeared including practical examinations and project work of that SEE.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the CCE for further action toward suitable punishment.	

Note: ***The student(s) found indulging in malpractices during the CIE also will be punished based on the recommendations of the College Academic Committee.***

Malpractices identified by squad or special invigilators

1. Punishments to the students as per the above guidelines.

Academic Regulations for B.Tech. with Minors Programme under MR22
(Applicable for Batches Admitted from 2022-23)

1. Objectives

The key objectives of offering B. Tech. with Minor program are:

- To expand the domain knowledge of the students in one of the other programmes of engineering.
- To increase the employability of undergraduate students keeping in view of better opportunity in interdisciplinary areas of engineering & technology.
- To provide an opportunity to students to pursue their higher studies in the inter-disciplinary areas in addition to their own programme of study.
- To offer the knowledge in the areas which are identified as emerging technologies/thrust areas of Engineering.

2. Academic Regulations for B.Tech. Degree with Minor programmes

- A student shall be awarded B.Tech with Minor, if he/she earns a minimum of 18 credits in the respective minor program in addition to the 160 credits of 4 year B.Tech program. These credits shall be acquired by either registering courses in the respective minor program offered by the college or through MOOCs equivalent to the courses offered by the university.
- A student enrolled in a B.Tech program may do a Minor in another area (ex., B.Tech. in Mechanical Engineering with Minor in AI&ML).
- The additional 18 credits for B.Tech with Minor program may be obtained between the 5 thand 8 th semester within the 4-year B. Tech program

a) The duration of the course and all the academic regulations are on par with regular 4-years B. Tech. program.

b) The weekly instruction hours, internal and external evaluation, and award of grades for courses registered in minor program are on par with courses of 4-year B.Tech. program.

c) After registering for the Minor program, if a student is unable to earn the required 18 credits in a specified duration (twice the duration of the course i.e. 8 years), he/she shall not be awarded Minor degree. However, if the student earns the required 160 credits of B.Tech., he/she will be awarded only B. Tech degree in the concerned branch.

d) There is no transfer of credits from Minor program to regular B.Tech program and vice-versa.

e) The additional 18 credits shall be earned by either registering courses in the respective minor program offered by the host department in the college or do a course in MOOCs platform.

f) For the course selected under MOOCS platform following guidelines may be followed:

i. Prior to registration of MOOCS courses, formal approval of the courses by the University/College is essential. The approval is based on the parameters like the institute / agency offering the course, syllabus, credits, duration of the programme and mode of evaluation etc.

ii. Minimum credits for MOOCs course must be equal to or more than the credits specified in the Minor course structure provided by the University/College.

iii. Only grades/marks above pass-grade/pass-marks shall be considered for inclusion of grades in minor grade memo.

iv. Any expenses incurred for the MOOCS courses are to be met by the students only.

g) A student after registering for a minor program can withdraw at any time. On withdrawal, a student will be awarded only B.Tech in the concerned branch if he fulfils all academic requirements and earns 160 credits.

i) A student can choose only one minor program along with his/her basic engineering degree. A student who chooses an honours program is not eligible to choose a minor program and vice-versa.

j) A student can graduate with a minor if he/she fulfils the requirements of regular B.Tech. program and the requirements of minor program

k) The institute shall maintain a record of students registered and pursuing their Minor programmes, minor programme-wise and parent programme -wise. The same report needs to be sent to the University once the enrolment process is complete.

l) The institute / department shall prepare the time-tables for each Minor course offered at their respective institutes without any overlap/clash with other courses of study in the respective semesters.

3. Eligibility conditions for the student to register for Minor programme

i) Students who have earned all the credits (no active backlogs) till II year I semester at the time of entering III year I semester are eligible to register for minor program.

ii) A prior approval of mentor and Head of the Department for enrolment into minor program is mandatory before the commencement of III year I semester.

iii) Registration to a minor program is purely the choice of the students. Only top 50% of the total class in each specialization are eligible to register for minor programs. The merit is based on the overall percentage of marks without active backlogs up to 3rdsemester (II-year I semester).

\

4. Registration for the courses in Minor Programme

a) At the beginning of each semester, just before the commencement of classes, students shall register for the courses which they wish to take in that semester.

b) The students should choose a course from the list against each semester (from Minors course structure) other than the courses they have studied/registered for regular B.Tech. programme. No course should be identical to that of the regular B.Tech. course. The students should take the advice of faculty mentors while registering for a course at the beginning of semester.

c) The maximum No. of courses for the Minor is limited to two (three in case of inclusion of lab) in a semester along with regular semester courses.

d) The registration fee to be collected from the students by the College is **Rs. 1000/-** per one credit.

e) A fee for late registration may be imposed as per the norms.

5. Minor courses and the offering departments

S. No.	Minor Programme	Eligible programme of students	@Offering Department	Award of Degree
1	CSE	CE, EEE, ME, ECE, Mi.E	CSE / CSE (AI&ML) /B.Tech. (AI&ML)/ B.Tech. (AI)/ B.Tech. CSE(AI)	"B.Tech. in programme name with Minor in CSE"
2	Electric Vehicles	All branches	EEE	"B.Tech. in programme name with Minor in EEE"
3	Construction Technology	All branches	CE	"B.Tech. in programme name with Minor in CE"
4	Robotics	All branches	ME	"B.Tech. in programme name with Minor in ME"
5	AIML	All branches, except CSE-AIML	CSE - AIML	"B.Tech. in programme name with Minor in CSE-AIML"

MR 24 REGULATIONS

Course Structure for

B Tech EEE PROGRAMME

I Year B.Tech. (I Semester)

Category	Course Code	Subject	L	T	P	Credits
BSC	D0B01	Matrices and Calculus	3	1	-	4
HSMC	D0H01	English for Skill enhancement	3	1	-	4
PCC	D0201	Basic Electrical Engineering	3	-	-	3
ESC	D0501	Programming for Problem Solving	3	-	-	3
HSMC	D0H02	English Language and Communication	-	-	2	1
PCC	D0202	Basic Electrical Engineering Lab	-	-	2	1
ESC	D0502	Programming for Problem Solving Lab	-	-	2	1
ESC	D0302	Engineering Workshop	-	-	2	1
		Total	**12**	**2**	**8**	**18**

I Year B.Tech. (II Semester)

Category	Course Code	Subject	L	T	P	Credits
BSC	D0B02	Ordinary Differential Equations and Vector	3	1	-	4
BSC	D0B08	Applied Physics	3	1	-	4
BSC	D0B10	Engineering Chemistry	3	1	-	4
ESC	D0305	Engineering Drawing	3	-	-	3
PCC	D0401	Analog Electronics	3	-	-	3
BSC	D0B09	Applied Physics Lab	-	-	2	1
BSC	D0B11	Engineering Chemistry Lab	-	-	2	1
ESC	D0505	Basic Python Programming Lab	-	-	2	1
PCC	D0402	Analog Electronics Lab	-	-	2	1
		Total	**15**	**3**	**8**	**22**

II Year B.Tech. (III Semester)

Category	Course Code	Subject	L	T	P	Credits
BSC	D0B03	Complex Variables and Numerical Methods	3	-	-	3
ESC	D0403	Digital Electronics	3	-	-	3
ESC	D0314	Solid Mechanics and Hydraulic Machines	3	-	-	3
PCC	D0205	Electrical Circuit Analysis and Synthesis	2	1	-	3
PCC	D0206	Electromagnetic Fields	3	-	-	3
ESC	D0561	Fundamentals of Data Structures Lab	-	1	2	2
ESC	D0407	Digital Electronics Lab	-	-	2	1
PCC	D0207	Electrical Circuits Lab	-	-	4	2
MC	D00M2	Environmental Science	2	-	-	-
			16	2	8	20

II Year B.Tech. (IV Semester)

Category	Course Code	Subject	L	T	P	Credits
HSMC	D0H08	Business Economics and Financial Analysis	3	-	-	3
ESC	D0460	Signals and Systems	3	-	-	3
PCC	D0208	Power Generation and Distribution Systems	3	-	-	3
PCC	D0209	DC Machines and Transformers	3	1	-	4
PCC	D0210	Control Systems	2	1	-	3
ESC	D0461	Basic Simulation Lab	-	-	2	1
PCC	D0211	DC Machines and Transformers Lab	-	-	2	1
ESC	D0555	Object Oriented Programming Lab	-	-	2	1
MC	D00M1	Gender Sensitization	-	-	2	-
PROJ	D00P1	Real-time Research Project/ Field Based Project	-	-	1	1
			14	2	9	20

III Year B.Tech. (VSemester)

Category	Course Code	Subject	L	T	P	Credits
PCC	D0212	Power Transmission Systems	2	1	-	3
PCC	D0213	AC Machines	3	1	-	4
PCC	D0214	Power Electronics	3	-	-	3
PCC	D0215	Electrical Measurements and Instrumentation	3	-	-	3
PEC-I	D0224	High Voltage Engineering	2	1	-	3
	D0225	Graphical Programme and Applications				
	D0226	Advanced Control Systems				
	D0227	Digital Control Systems				
	D0228	Fundamentals of Nanoscience				
PCC	D0216	AC Machines Lab	-	-	2	1
PCC	D0217	Control Systems Lab	-	-	2	1
ESC	D0563	Fundamentals of Database Management Systems Lab	-	1	2	2
MC	D00M3	Quantitative Aptitude and Verbal Reasoning - I	1	1	-	-
MC	D00M6	Intellectual Property Rights	3	-	-	-
			17	**5**	**6**	20

III Year B.Tech. (VI Semester)

Category	Course Code	Subject	L	T	P	Credits
PCC	D0218	Power System Analysis	3	-	-	3
HSMC	D0H09	Management Fundamentals	3	-	-	3
ESC	D0410	Microprocessors and Microcontrollers	3	-	-	3
PEC-II	D0229	Electrical Drives	3	-	-	3
	D0230	Electrical Machine Design				
	D0231	Electrical Estimation & Costing				
	D0232	SMPS and UPS				
	D0233	Bio Medical Instrumentation				
OEC-I		Open Elective – I	3	-	-	3
HSMC	D0H03	English Communication and Presentation Skills Lab	-	-	2	1
PCC	D0219	Electrical Measurements and Instrumentation Lab	-	-	2	1
PCC	D0220	Power Electronics Lab	-	-	2	1
MC	D00M4	Quantitative Aptitude and Verbal Reasoning - II	1	1	-	-
MC	D00M5	Constitution of India	3	-	-	-
PROJ	D00P1	Industry Oriented Mini Project/ Internship	-	-	4	2
			19	**1**	**10**	20

IV Year B.Tech. (VII Semester)

Category	Course Code	Subject	L	T	P	Credits
PCC	D0221	Power System Operation and Control	3	-	-	3
PCC	D0222	Switchgear and Protection	3	-	-	3
PEC-III	D0234	Non-Conventional Energy Sources	3	-	-	3
	D0235	Electrical Hybrid Vehicles				
	D0236	Electrical Distribution Systems				
	D0237	Modern Power Converters				
	D0238	Power Systems Transients				
PEC-IV	D0239	Utilization of Electrical Energy	3	-	-	3
	D0240	HVDC and FACTS				
	D0241	Electrical Energy Conservation and Auditing				
	D0242	Power System Reliability				
	D0243	PLC and their Applications				
OEC-II		Open Elective - II	3	-	-	3
ESC	D0462	Microprocessors and Microcontrollers Lab	-	-	2	1
PCC	D0223	Power Systems Lab	-	-	2	1
PROJ	D00P2	PROJECT STAGE-I	-	-	6	3
			15	-	10	20

IV Year B.Tech. (VII Semester)

Category	Course Code	Subject	L	T	P	Credits
PEC-V	D0244	Electrical Power Quality	3	-	-	3
	D0245	Special Machines				
	D0246	Supervisory Control and Data Acquisition				
	D0247	Industrial Electrical System				
	D0248	Wearable Electronics				
PEC-VI	D0249	Wind and Solar Energy Systems	3	-	-	3
	D0250	Electrical Smart Grid				
	D0251	AI Applications in Electrical Engineering				
	D0252	Neural Network and Fuzzy Logic				
	D0253	Automotive Electrical and Electronics Systems				
OEC-III		Open Elective - III	3	-	-	3
PROJ	D00P3	PROJECT STAGE-II Including SEMINAR	-	-	22	11
			6	**0**	**22**	20

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. I Semester		
Code: D0B01	MATRICES AND CALCULUS	L	T	P
Credits:4	(Common to All)	3	1	-

Prerequisites: Mathematics Knowledge at pre-university level

Course Objectives: To learn

1) The types of matrices, finding the inverse of a matrix, rank of a matrix, and applying the concept of rank to know the consistency of linear equations and to find all possible solutions, if any exist.
2) Eigen values and Eigen vectors of a matrix, Diagonalization of a matrix, the Cayley Hamilton theorem, and reducing a quadratic form into a canonical form through an orthogonal transformation.
3) Concept of mean value theorems and their applications to the mathematical problems and Evaluation of improper integrals using beta and gamma functions.
4) Partial differentiation, Jacobian, maxima and minima, and Taylor series expansion of functions of two variables.
5) Evaluation of multiple integrals and their applications in the allied fields.

MODULE I: Matrices [8 Periods]

Matrices: Types of Matrices, Symmetric, Skew-symmetric,Hermitian,Skew-Hermitian, orthogonal and Unitary matrices; Rank of a matrix by Echelon form and Normal form; Inverse of Non-singular matrices by Gauss-Jordan method; Solving system of homogeneous and non-homogeneous linear equations, Linearly independent and dependent set of vectors, LU – Decomposition Method.

MODULE II: Eigen Values and Eigen Vectors [8 Periods]

Linear Transformation, Orthogonal Transformation: Eigen values, Eigen vectors,and their properties; Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); Finding the inverse and power of a matrix by Cayley-Hamilton Theorem.

Quadratic Forms: Nature, rank, index and signature of the Quadratic form, Reduction of Quadratic form to Canonical forms by Orthogonal Transformation method.

MODULE III: Calculus [10 Periods]

(A) Mean value theorems: Rolle's Theorem and Lagrange's Mean value theorem with their Geometrical Interpretation and its applications, Cauchy's mean value theorem. Taylor's Series.(All theorems without proof)

(B) Beta and Gamma Functions

Introduction to Improper Integrals, Definition of Beta and Gamma Functions, Properties and Other Forms. Relation between beta and gamma functions. Evaluation of improper integrals using beta and gamma functions.

MODULE –IV: **Multivariable Calculus [10 Periods]**

Definitions of Limit and Continuity. Partial Differentiation: Euler's Theorem, Total Derivative, Jacobian, Functional dependence and independence. Taylor's Series for functions of two variables, Applications: Maxima and Minima of function two variables and three variables using Method of Lagrange Multipliers.

MODULE - V: Multiple Integrals [12 Periods]

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. Finding areas using double integrals and volumes using double and triple integrals.

TEXT BOOKS:

1) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2) D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
3) Richard Bellman, Introduction to matrix Analysis, Siam, second Edition.
4) R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition 2016.

REFERENCES:

1) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,2002.
3) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,
   Reprint, 2008.
4) V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, AffiliatedEast–West press, Reprint 2005.
5) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint,2010.

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

1) Find the Rank of a matrix, inverse of a matrix and analyse the solution of system of linear equations.
2) Find the Eigen values and Eigen vectors of a matrix, Diagonalization of a matrix, verification of Cayley Hamilton theorem and Reduce the quadratic form to canonical form.
3) Verify mean value theorems; expand the given function using Taylor's series and Evaluate Improper Integrals using Beta and Gamma Functions.
4) Find the Jacobian, maxima and minima, Taylor series expansion of functions of two variables and partial derivatives.
5) Evaluate multiple integrals and its applications in areas and volumes.

CO- PO Mapping												
(3/2/1indicates strength of correlation) 3-Strong,2-Medium,1-Weak												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	2	2	3	3	-	-	-	-	-	-	2
CO2	3	2	2	-	-	-	-	-	-	-	2	-
CO3	3	-	-	3	2	-	-	-	-	-	3	2
CO4		2	2	2	3	-	-	-	-	-	2	2
CO5	2	2	2	3	3	-	-	-	-	-	-	2

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B. Tech. ISemester		
Code: D0H01	ENGLISH FOR SKILL ENHANCEMENT	L	T	P
Credits: 4		3	1	0

ENGLISH FORSKILL ENHANCEMENT

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 studyskills and communication skills in various professional situations.
3. Equip students to study engineering subjects more effectivelyand critically using the theoreticaland practical components of the syllabus.

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 ProperPunctuation- 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 Black Swan, Hyderabad.

Vocabulary: Words Often Misspelt - 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 ofRequisition, Email Etiquette, Job Application with CV/Resume.

UNIT - IV

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

Vocabulary: Technical Vocabularyand their Usage

Grammar : Common Errors in English (*Covering all the other aspects of grammar which were notcovered in the previous units*)

Reading : Reading Comprehension-Exercises for Practice

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

Note: ***Listening and Speaking Skills which aregiven under Unit-6 in AICTEModel Curriculum are coveredin the syllabus of ELCS Lab Course.***

- **Note: 1**. As the syllabus of English given in AICTE *Model Curriculum-2018 for BTec.h 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 NEP 2020, teachers are requested to be flexible toadopt 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 Black Swan Pvt. Ltd,

Hyderabad. 2022.Print.

REFERENCEBOOKS:

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.

Course Outcomes with BLOOM's

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

	Course Outcomes	**Bloom's Taxonomy**
CO1	Understand the importance of vocabularyand sentence structures.	Understand (L3)
CO2	Choose appropriate vocabulary and sentence structures for their oral and writtencommunication.	Apply (L3)
CO3	Demonstrate their understanding of the rules of functional grammar.	Understand (L2)
CO4	Develop comprehension skills from the known and unknown passages.	Apply (Level3)
CO5	Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports invarious contexts.	Apply (Level4)
CO6	Acquire basic proficiency in reading and writing modules of English.	Apply (Level3)

CO-PO Mapping **(3/2/1/ indicates strength of correlation) 3-Strong, 2-Medium, 1-**															
COs	**Programme Outcomes (Pos)**														PSOs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	**2**	**2**	**3**	-	**2**	-	-	-
CO2	-	-	-	-	-	-	-	-	-	**3**	**2**	-	-	-	-
CO3	-	**1**	**1**	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	**1**	**2**	-	**2**	-	**2**	-	-	-
CO5	-	**1**	**1**	-	-	-	**1**	-	-	**2**	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	**1**	**1**	-	-	-	-	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. I Semester		
Code: D0201	BASIC ELECTRICAL ENGINEERING (Common for ECE & EEE)	L	T	P
Credits: 3		3	-	-

Prerequisites: Mathematics

Course Objectives:

- To understand concept of electrical circuits and its components
- To understand Single phase AC circuits
- To study and understand the Transformers.
- To study and understand DC & AC machines
- To import the knowledge of various electrical installations and the concept of power factor and its improvement.

UNIT-I: (10 Periods)

D.C.Circuits: Electrical Circuit Elements(R, L and C), Ohms law , Star -Delta & Delta –Star Transformation, Types of Energy Sources, KVL & KCL, Analysis of Simple Circuits (Mesh and Nodal Analysis) with DC excitation only. Superposition, Thevenins and Maximum Power Transfer Theorems with DC excitation only.

UNIT-II: (10 Periods)

A.C. Circuits: Representation of Sinusoidal Waveforms, Average value , RMS value & Peak value, Phasor Representation, Real power, Reactive Power, Apparent Power, Power Factor, Analysis of Single-Phase AC Series Circuits Consisting of R, L, C, RL, RC, RLC combinations(Simple problems). Resonance in series R-L-C circuit.

UNIT-III: (10 Periods)

Transformers: Working Principle of Single Phase Transformer, EMF Equation of Transformer , Ideal and practical transformer, Equivalent Circuit, Open Circuit and Short Circuit Tests on Single Phase Transformer, Losses in transformers, Regulation and Efficiency.

UNIT-IV: (10 Periods)

Electrical Machines: Construction and Working Principle of DC Machines, Performance characteristics of DC Motors. Construction and Working Principle of Three-Phase Induction motor, Significance of Torque-Slip Characteristics. Construction and Working of Synchronous Generator.

UNIT-V: (10 Periods)

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU),MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries, battery backup Elementary calculations for energy consumption, power factor improvement.

TEXTBOOKS:

1. D.P.KothariandI. J.Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,4th Edition,2019.
2. M S Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata Mc Graw Hill,2nd Edition,2008.

REFERENCEBOOKS:

1. P. Ramana, M.Suryakalavathi, G.T. Chandrasheker, "Basic Electrical Engineering",S.Chand,2nd Edition,2019.
2. D.C.Kulshreshtha, "Basic Electrical Engineering",McGrawHill,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 Electrical Engineering",2nd Edition, McGrawHill, 2021.
5. L.S.Bobrow, "Fundamentals ofElectricalEngineering",OxfordUniversityPress,2011.
6. E.Hughes, "Electrical and ElectronicsTechnology",Pearson,2010.
7. V.D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989

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

CO1: Understand and analyze basic Electrical circuits

CO2: Understand Single phase AC circuits

CO3: Study the concepts of Transformers

CO4: Understand and analyze DC & AC Machines

CO5: Analyze the basic concepts of batteries.

Course Outcomes	**Program Outcomes (Pos)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	1	-	1	-	-	-	2	-	2	2
CO2	3	2	1	-	3	1	-	1	1	2	1	2
CO3	3	2	1	1	3	2	-	-	1	-	2	2
CO4	3	2	1	-	3	1	-	1	1	2	1	2
CO5	3	2	1	1	3	2	-	-	1	-	2	2

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech I Semester		
Code: D0501	Programming for Problem Solving (Common for CE, EEE, ME, ECE, CSE, CSE (AI & ML), CSE (DS), and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives:

1. Understand the basic terminology, write, compile and debug programs in computer programming
2. Implement different control statements for solving problems.
3. Understand the concept of structured programs and arrays.
4. Implement the idea of strings and pointers.
5. Analyse the usage of structures and different file operations.

MODULE I: Fundamentals and Introduction to 'C' Language [10 Periods]

Introduction Fundamentals– Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development Method, Algorithms, Pseudo code, flow charts, applying the software development method

Introduction to 'C' Language: – Background, C-tokens- Keywords, Identifiers, Basic data types, Variables, Constants, Preprocessor directives-include, define, Managing Input / Output functions - formatted input / output functions, Operators. Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Simple C Programming examples.

MODULE II: Conditional Statements and Repetition Statements [09 Periods]

Conditional Statements: Simple if statement, if-else statement, if-elseif- ladder, nested if else, Dangling else problem, switch statements.

Repetition statements – while, for, do-while statements, nested looping, other statements related to looping – break, continue, goto, Simple C Programming examples.

MODULE III: Designing Structured Programs and Arrays [10 Periods]

Designing Structured Programs-Introduction to function, Advantages, user defined functions; inter function communication-call by value, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion – recursive functions-Towers of Hanoi problem.

Arrays: Basic Concepts, Types of arrays, applications- Selection sort, Bubble sort, Linear search method, arrays and functions.

MODULE IV: Strings and Pointers [09 Periods]

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

Pointers – Basic Concepts, Pointers for inter function communication-call by reference, pointers to pointers, Pointer arithmetic, array of pointers, pointers to array, applications, pointers to void, pointers to functions, Dynamic memory allocation functions

MODULE V: Structures and File Handling [10 Periods]

Structures – Declaration, definition and initialization of structures, accessing structure elements, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, difference between structures and union, typedef, bit fields, enumerated types, C programming examples.

Files – Basic Concept of a file, file input / output operations, text files and binary files, file status functions (error handling), Random file access functions, command –line arguments. C program examples.

TEXTBOOKS

1. Computer Fundamentals and Programming in C, P. Dey, M Ghosh, Second edition, Oxford University Press.
2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Eighth Edition, Pearson Education.
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

REFERENCES

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning
2. C for Engineers and Scientists, H.Cheng, Mc.Graw-Hill International Edition
3. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press

E–RESOURCES

1. http://oxford university press.ac.in/eBooks/ Programming in C.
2. https://www.journals.elsevier.com/science-of-computer-programming
3. http://www.ejournalofsciences.org
4. http://onlinecourses.nptel.ac.in/iiitk_cs-101
5. http://onlinevideolecture.com/ebooks/?subject=C-Programming

Course Outcomes:

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

1. Write algorithms and to draw flowcharts for solving problems and translate the algorithms/flowcharts to programs (in C language).
2. Apply different types of control structures to code and test a given logic in C programming language.
3. Decompose a problem into functions and to develop modular reusable code and Use arrays to formulate algorithms and programs for Searching and sorting problems.
4. Develop programs that make use of concepts such as strings, pointers.
5. Analyse structures, file operations and command line arguments.

CO- PO,PSO Mapping															
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes (POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	-	-	-	-	-	-		-	-	-	3	2	2
CO2	3	2	1	-	-	-	-	-	-	-	-	1	3	2	1
CO3	3	3	1	-	-	-	-	-	-	-	-	1	3	2	1
CO4	3	1		-	-	-	-	-	-	-	-	2	3	2	1
CO5	3	3	1	-	-	-	-	-	-	-	-	2	3	2	1

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B. Tech. ISemester		
Code: D0H02	ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB (Common for All branches)	L	T	P
Credits: 1		0	0	2

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:

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

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 LSRWskills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speechof 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
- Intensivelistening
- 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) Sessions

Thefollowing course content is prescribed forthe **English Languageand Communication**

Skills Lab.**Exercise – I**

CALL 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–II

CALL Lab:

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

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern insentences – 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 andSeeking Permissions - Telephone Etiquette.

Exercise – III

CALL Lab:

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

Practice: Common Indian Variants in Pronunciation – Differences between British and AmericanPronunciation -*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 – IV

CALL 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 – V

CALL 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:

i) Computers with Suitable Configuration
ii) High Fidelity Headphones

2. **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 contents of 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 University Press.
- 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)

REFERENCEBOOKS:

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
6. Cambridge IELTS by Cambridge University Press
7. How to prepare for the TOEFL Ibt 12th edition by Pamela. J. Sharp, Galgotia Publications
8. The GRE for Dummies 2nd edition by Suzee Vik, Comdex computer publishing.

Course Outcomes with BLOOM's

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

	Course Outcomes	**Bloom's Taxonomy**
CO1	Understand the nuances of English language through audio- visual experience and groupactivities	Apply (L3)
CO2	Neutralize their accent for intelligibility	Apply (L3)
CO3	Speak with clarity and confidence which in turn enhances their employabilityskills	Apply (L2)

CO-PO Mapping **(3/2/1/ indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**															
COs	**Programme Outcomes (Pos)**														PSOs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	3	3	-	-	-	-	-
CO2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	2	2	3	-	-	-	-	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. I Semester		
Code: D0202	BASIC ELECTRICAL ENGINEERING LABORATORY (Common for ECE & EEE)	L	T	P
Credits: 1		-	-	2

Prerequisites: Basic Electrical Engineering

Course Objectives:

- To understand concept of electrical circuits and its components
- To understand Single phase AC circuits
- To study and understand the Transformers.
- To study and understand DC & AC machines
- To import the knowledge of various electrical installations and the concept of power factor and its improvement.

List of Experiments:

PART-A(compulsory)

1. Verification of Ohms law
2. Verification of KVL and KCL
3. Verification of Thevenin's theorem
4. Determination of Phase Angle for RC Series Circuit
5. Resonance in Series RLC Circuit.
6. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
7. Brake test on a DC Shunt Motor. Determination of performance curves
8. Brake test on a Three-phase Induction Motor. Determination of performance curves

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

1. Verification of Superposition theorem.
2. Verification of Maximum Power Transfer Theorem
3. OC & SC Tests on Single Phase Transformer
4. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
5. No-Load Characteristics of a Three-phase Alternator

TEXT BOOKS:

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

REFERENCEBOOKS:

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

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

CO1: Understand and analyze basic Electrical circuits

CO2: Understand Single phase AC circuits

CO3: Study the concepts of Transformers

CO4: Understand and analyze DC & AC Machines

CO5: Analyze the basic concepts of batteries.

Course Outcomes	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	-	3	-	3	-	-	-	1	-	1	2
CO2	2	-	2	-	3	-	-	-	-	-	-	1
CO3	2		2		2				-	-	-	3
CO5	2	-	2	-	3	-	-	-				1
CO5	2	-	2	-	2	-	-	-	-	-	-	3

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. I Semester		
Code: D0502	**Programming for Problem Solving Lab**	L	T	P
Credits: 1	**(Common for ALL)**	-	-	2

[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.html
Eclipse: http://www.eclipse.org
This list is not exhaustive and is NOT in any order of preference]

Prerequisites: NIL

Course Objectives:

1. Understand the various steps in Program development
2. Identify syntax and semantics of C Programming Language
3. Illustrate the usage of structured programming approach in solving problems.
4. Develop programs that make use of arrays, strings, pointers and structures in C language
5. Analyse different file operations

Simple Basic problems:

a. Write sample examples of C programs to implement basic operations.
b. Write a C program to find smallest and largest of given three numbers
c. Write a C program to find the roots of a quadratic equation.
d. 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:
   5 x 1 = 5
   5 x 2 = 10
   5 X 3 = 15
e. .Write a C program to find the sum of individual digits of a positive integer

Numeric problems:

a. Write a C program to generate the first 'n' terms of the sequence. [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.]
b. Write a C program to find whether the given number is palindrome.
c. Write a C program to find whether the given number is perfect or not.
d. Write a C program to find whether the given number is Armstrong or not.
e. Write a C program to find whether the given number is strong or not.

f. Write a C program to generate all the prime numbers between n1 and n2, where n1 and n2 are values supplied by the user.

Arrays and Stings:

a. Write a C program to perform Addition of Two Matrices
b. Write a C program to perform Multiplication of Two Matrices
c. Write a C program to find both the largest and smallest number in a list of integers
d. Write a C program to search for a key value in a given list of integers using linear search.
e. Write a C program that implements the Bubble sort method to sort a given array of integers in ascending order
f. Write a C program To insert a sub-string into given main string from a given position.
g. Write a C program To delete n characters from a given position in a given string
h. Write a C program To find substring in a given string
i. Write a C program to determine if the given string is a palindrome ornot
j. Write a C program to count the lines, words and characters in a given text

Functions, Pointers and Structures:

a. Write C programs that use both recursive and non-recursive functions to find the factorial of a given integer.
b. Write C programs that use both recursive and non-recursive functions to find the GCD (greatest common divisor) of two given integers.
c. Write a C program to swap two numbers, which implement call by value and call by reference.
d. Write a C program to display the below student details using structures

Roll Number	Name	Gender	Branch	Attendance percentage
501	John	male	CSE	77.3
502	Alice	male	ECE	80.5
503	Sam	Female	IT	90.7

e. Write a C program to find grade of a student using structures

Files and Command Line Arguments:

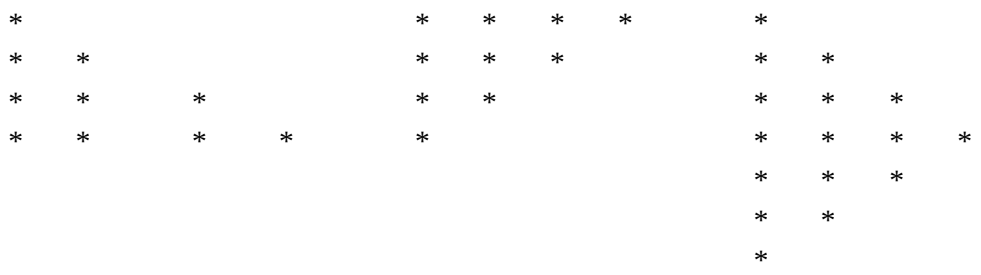
a. Write a C program to display contents of a file
b. Write a C program which copies one file to another.
c. Write a C program to find sum of two numbers using command line arguments

Miscellaneous:

a. Write a C program to construct number Patterns of numbers as follows:

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

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



c. Write a C program to construct alphabets Patterns of numbers as follows:

```
A
A B
A B C
```

```
A
B C
D E F
```

```
A
B B
C C C
```

Mini Project:

a. Develop a mini project which implement the Library Management System
b. Develop a mini project which implement the Student Record System

Course Outcomes:

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

1. Analyse concepts in problem solving and write diversified solutions for a given problem.
2. Identify situations where computational methods and computers would be useful.
3. Understand the programming tasks using techniques learned and write pseudo-code.
4. Compare the program on a computer, edit, compile, debug, correct, recompile and execute it.
5. Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve thetask

TEXT BOOKS:

a. Computer Fundamentals and Programming in C, P. Dey, M Ghosh, Second edition, Oxford University Press
b. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Eighth Edition, Pearson Education.
c. The C Programming Language, B.W. Kernighan and Dennis Ritchie, PHI/Pearson Education

REFERENCES:

a. C Programming & Data Structures, B.A. Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
b. C for Engineers and Scientists, H. Cheng, Mc. Graw-Hill International Edition

c. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press

CO- PO,PSO Mapping															
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes (POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	-	-	-	-	-	-		-	-	-	3	2	-
CO2	3	2	1	-	-	-	-	-	-	-	-	1	3	3	1
CO3	2	3	1	-	-	-	-	-	-	-	-	1	3	2	1
CO4	3	3	2	-	-	-	-	-	-	-	-	1	2	2	3
CO5	3	2	2	-	-	-	-	-	-	-	-	1	1	2	3

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	BTech I Semester		
Code:D0302	ENGINEERING WORKSHOP (Common for ECE,EEE, CE and ME)	L	T	P
Credits: 1		-	-	2

COURSE OBJECTIVES:

To understand the usage of hand tools, acquire the skills in model / pattern making and familiarize with various work materials and tools.

I. TRADES FOR EXERCISES:

At least two exercises from each trade:

1. Carpentry 2.Fitting 3. Tin-Smithy
4. House-wiring 5.Foundry 6.Arc welding

II. TRADES FOR DEMONSTRATION & EXPOSURE

1. Machine shop
2. Plumbing
3. Wood working lathe
4. Identification of Electronic Components
5. Blacksmithy
6. Computer Peripherals

COURSE OUTCOMES

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

1. Knowledge of carpentry process and methods used in the design and fabrication, installation, maintenance and repair of structures and fixtures (e.g., furniture, cabinets) to accomplish work assignments.
2. Assembling together of part and removing metals to secure the necessary joint by using fitting and welding.
3. Understand the hardware components of house wiring.
4. Understand the manufacturing process using machine shop.
5. Analyze the different types of computer Peripherals

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes(POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PO1**	**PO2**	**PO3**
CO1	**3**	-	-	-	**2**	**2**	**1**	-	**3**	-	-	**3**	-	**2**	-
CO2	**3**	-	-	-	**2**	**2**	**1**	-	**3**	-	-	**3**	-	**2**	-
CO3	**3**	-	-	-	**2**	**2**	**1**	-	**3**	-	-	**3**	-	**2**	-
CO4	**3**	-	-	-	**2**	**2**	**1**	-	**3**	-	-	**3**	-	**2**	-
CO5	**3**	-	-	-	**2**	**2**	**1**	-	**3**	-	-	**3**	-	**2**	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech.II Semester		
Code:D0B02	ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (Common to All)	L	T	P
Credits:4		3	1	-

Pre-requisites: Mathematics knowledge at pre -University level

Course Objectives: To Learn

1) Methods of Solving First order Ordinary Differential Equations and its applications.
2) Methods of Solving Higher order Ordinary Differential Equations and its applications.
3) Laplace Transforms and its applications.
4) Gradient, Divergence, curl and Scalar potential function.
5) Line, Surface and volume integrals, and vector integral theorems.

MODULE I: First Order and First Degree Ordinary Differential Equations [8 Periods]

Exact Differential Equations, Non-Exact Differential Equations, Linear Differential Equations, Bernoulli's Differential Equations.

Applications: Orthogonal trajectories (Cartesian and polar form), Newton's law of cooling, Law of natural growth and decay.

MODULE II: Higher Order Ordinary Differential Equations with Constant Coefficients [12 Periods]

Introduction-Homogenous, Non-homogeneous differential equations. Complementary function and Particular integral, Non-Homogeneous terms of the type e^{ax} , sin(ax), cos (ax), polynomial in x, e^{ax} V(x), x^k V(x), Method of variation of parameters.

Applications: LCR Circuit.

MODULE III: Laplace Transforms [10 Periods]

(A) Laplace Transforms: Laplace transform of standard functions, First shifting theorem, Unit step function, Dirac delta function, second shifting theorem, Laplace transform of functions when multiplied and divided by t. Laplace transforms of derivatives and integrals of functions, Evaluation of integrals using Laplace transforms, Laplace transform of Periodic functions.

(B) Inverse Laplace transform by different methods, Convolution Theorem, Applications: Solving Initial value problems by Laplace transform method. (All the theorems without proof).

MODULE-IV: Vector Differentiation [8 Periods]

Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Vector Identities, Solenoidal and Irrotational vectors, Scalar potential function.

MODULE-V: Vector Integration **[10 Periods]**

Line, Surface and Volume Integrals. Greens Theorem, Gauss Divergence Theorem and Stokes Theorem (without proofs) and their applications.

TEXT BOOKS:

1) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2) R.K.Jain and S.R.K.Iyengar , Advanced Engineering Mathematics , Narosa Publications, 5th Edition 2016.

REFERENCES:

1) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, Jogn Wiley & Sons,2006.
2) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Ed, Pearson, Reprint, 2002.
3) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4) Alan Jeffrey, Mathematics for Engineers and Scientists, 6th Edition, 2013, Chapman & Hall.
5) Kanti. B.Datta, Mathematical Methods of Science and Engineering, Cengage Learning.

Course Outcomes: After learning the contents of this course the student must be able to

1. Solveexact and linear differential equations and find orthogonal trajectories of given family of curves.
2. Understand complementary function, particular integral, and Solvesecond and higher order Ordinary Differential Equations.
3. Find Laplace transform of given functions, inverse Laplace transform byconvolution theorem and Solution of ordinary differential equations.
4. Find Gradient, Divergence, curl and Scalar potential function.
5. EvaluateLine, Surface and volume integrals and verify Vector integral theorems.

CO- PO Mapping												
(3/2/1indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	2	-	2	3	2	-	-	-	-	2	3
CO2	2	-	3	-	3	2	-	-	-	-	2	3
CO3	-	2	-	2	3		-	-	-	-	-	2
CO4	2	-	2	2	3	3	-	-	-	-	2	3
CO5	3	-	2	2	3		-	-	-	-	-	2

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B. Tech. II Semester		
Code: D0B08	Applied Physics Common to: EEE, ECE, CSE	L	T	P
Credits: 4		3	1	0

Pre-requisites: 10 + 2 Physics

Course Objectives:

The objectives of this course for the student are to:

1. Understand the basic principles of quantum physics and band theoryof solids.
2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Studythe fundamental concepts related to the dielectric, magnetic and energymaterials.
4. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
5. Studythe 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. Identifythe 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.

MODULE - I: QUANTUM PHYSICS AND SOLIDS

Quantum Mechanics: Introduction to quantum physics, blackbody radiation — Stefan-Boltzmann'slaw, Wein's and Rayleigh-Jean'slaw, Planck's radiationlaw- photoelectric effect - Davisson and Germer experiment —Heisenberg uncertainty principle - Born interpretation of the wave function — time independent Schrodinger wave equation - particle in one dimensional potential box.

Solids: Symmetry in solids, free electron theory (Drude & Lorentz, Sommerfeld) - Fermi-Dirac distribution - Bloch's theorem-Kronig-Penneymodel— E-K diagram- effectivemass of electron-origin of energy bands- classification of solids.

MODULE - 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.

MODULE - III: DIELECTRIC, MAGNETIC AND ENERGY MATERIALS

Dielectric Materials: Basic definitions- types of polarizations (qualitative) - ferroelectric,

piezoelectric, and pyroelectric materials —applications — liquid crystal displays (LCD) and crystal oscillators.

Magnetic Materials: Hysteresis - soft and hard magnetic materials - magnetostriction, magnetoresistance - applications - bubble memory devices, magnetic field sensors and multiferroics. Energy Materials: Conductivity of liquid and solid electrolytes-superionic conductors - materials and electrolytes for super capacitors - rechargeable ion batteries, solid fuel cells.

MODULE - IV: NANOTECHNOLOGY

Nanoscale, quantum confinement, surface to volume ratio, bottom-up fabrication: sol-gel, precipitation, combustion methods — top-down fabrication: ball milling - physical vapor deposition (PVD) - chemical vapor deposition (CVD) - characterization techniques - XRD, SEM &TEM - applications of nanomaterials.

MODULE - V: LASER AND FIBER OPTICS

Lasers: Laser beam characteristics-three quantum processes-Einstein coefficients and their relations- lasing action - pumping methods- ruby laser, He-Ne laser , CO_2 laser, Argon ion Laser, Nd:YAG laser- semiconductor laser-applications of laser.

Fiber Optics: Introduction to optical fiber- advantages of optical Fibers - total internal reflection- construction of optical fiber - acceptance angle - numerical aperture-classificationof 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, 4th Edition,2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2nd 2022
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1st Edition, 2021.
6. P K Palanisamy, "Engineering Physics", SciTech Publication, 6th Edition, 2018.

REFERENCEBOOKS:

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 1 Edition, 2007.
6. Energy Materials, Taylor & Francis Group, 1°* Edition, 2022.

e-ESOURCES

1. https://www.researchgate.net/publication/259574083_Lecture_Notes_on_Engineering_Physics
2. https://www.livescience.com/33816-quantum-mechanics-explanation.html

3. https://nptel.ac.in/courses/115/102/115102025/

Journals :

1. http://www.springer.com/physics/theoretical%2C+mathematical+%26+computational +physics/journal/40094
2. http://www.springer.com/physics/journal/340

NPTEL VIDEOS:

1. http://nptel.ac.in/courses/113104012/
2. https://www.youtube.com/watch?v=9seDKvbaoHU&list=PLzJaFd3A7DZse2tQ2qUF ChSiCj7jBidO0&index=29
3. https://nptel.ac.in/courses/108/108/108108122/
4. https://nptel.ac.in/courses/115/101/115101005/

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COS	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	-	2	-	-	-	-	-	-	-	-
CO2	3	3	-	2	-	-	-	-	-	-	-	-
CO3	3	2	-	1	-	-	1	-	-	-	-	-
CO4	3	2	-	1	2	2	2	-	-	-	-	-
CO5	3	2	-	-		2	1	-	-	-	-	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B. Tech. II Semester		
Code: D0B10	Engineering Chemistry Common to: EEE, ECE, CSE	L	T	P
Credits: 4		3	1	-

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 batterychemistry, significance of corrosion it's control to protect the structures.
3. To acquire the knowledge about polymeric materials.
4. To imbibe the basic concepts of petroleum and its products.
5. To acquire required knowledge about engineering materials like Smart materials, and lubricants.

Module I: Water and its treatment [10 Periods]

Introduction to hardness of water – causes of hardness, expression of hardness, units and types of hardness-Numerical Problems–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. 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 process. Desalination of water-Reverse osmosis.

Module II: Polymeric materials [10 Periods]

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). Compounding– fabrication of plastics by injection moulding method.
Elastomers: Natural rubber and its vulcanization, Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.
Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

Module III: Battery Chemistry & Corrosion [14 Periods]

A. **Battery Chemistry:** Introduction to Electrochemistry - Classification of batteries- primary (dry cell), secondary (Lead-acid battery) and reverse batteries (Fused electrolyte cells) with examples. Basic requirements for commercial batteries. Construction, working and applications of Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of

Hydrogen-Oxygen fuel cell

B. Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism, Types of corrosion: Galvanic, Pitting and water-line corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods. Metallic coatings: Hot dipping (Galvanization).

Module IV:Energy Sources [10 Periods]

Introduction, Calorific value of fuel – HCV, LCV- Dulongs formula–numerical problems. 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. Hydrogen as fuel- production, storage and applications.

Module V: Engineering Materials: [10 Periods]

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

Smart materials and their engineering applications

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

Lubricants: Classification of lubricants with examples-characteristics of a 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 B. Rama Devi, P. Aparna and Prasanta Rath, Cengage learning.
2. P. C. Jain and Monica Jain, "A Text Book of Engineering Chemistry", Dhanpat Rai Publications, New Delhi, 16th Edition 2014.
3. S.S. Dara and S.S. Umare, "A Text Book of Engineering Chemistry", S Chand Publications, New Delhi, 12th Edition 2010.
4. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.

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)

Course Outcomes with BLOOM's

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

	Course Outcome	Bloom's Taxonomy Level
CO1	Understand the basic properties of water and its usage in domestic, industrial purposes and purification of water by various methods.	Understand**(L2)**
CO2	Acquire knowledge on electrochemical procedures related to corrosion and apply in its control methods, fuel cells, batteries and their applications.	Apply**(L3)**
CO3	Learn the fundamentals of preparation, properties and engineering applications of polymeric materials in daily life.	Apply**(L3)**
CO4	Acquire the knowledge on various fuels; identify a better fuel source based on calorific value.	Analyze **(L4)**
CO5	Acquire basic knowledge on usages of important engineering materials like cement and lubricants.	Apply**(L3)**

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	-	-	-	3	-	-	-	-	3	-	-	-
CO2	3	2	2	-	-	-	3	-	-	-	-	3	-	-	-
CO3	3	3	2	-	-	-	3	-	-	-	-	3	-	-	-
CO4	3	2	2	-	-	-	3	-	-	-	-	3	-	-	-
CO5	3	3	2	-	-	-	3	-	-	-	-	3	-	-	-

2024-25 Onwards (MR-24)	MALLAREDDYENGINEERINGCOLLEGE	B.Tech. II Semester		
Code:D0305	ENGINEERING DRAWING (Common for CSE, ECE and EEE)	L	T	P
Credits:3		2	-	2

Prerequisites: Nil

Course Objectives:

To develop in students, graphic skills for communication of concepts and ideas of engineering products.

MODULE I: Introduction to Engineering Drawing, Principles of Engineering Graphics and their significance, Lettering.
Geometrical Constructions: Regular polygons only. Conic Sections: Ellipse, Parabola, Hyperbola– General method only Cycloid and Involutes.
Scales: Plane Scale, Diagonal scale.

MODULE II: Orthographic Projections: Principles of Orthographic Projections – Conventions – First and Third Angle projections.

Projection of Points: Projection of points including all four quadrants.

Projection of Lines: Projection of Lines - parallel, perpendicular, inclined to one reference plane.

MODULE III: Projection of Planes: Axis inclined to one reference plane.

Projection of Solids: Projections of regular solids like cube, prism, pyramid, cylinder and cone by rotating object method. Axis inclined one reference plane.

MODULE IV: Section of Solids: Sectioning of single solid with the cutting plane inclined to one plane and perpendicular to the other-true shape of section.

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

MODULE V: Isometric Projections: Principles of Isometric Projection – Isometric Scale, Isometric Views– Conventions –Plane Figures, Simple Solids.

Transformation of Projections: Conversion of Isometric Views to Orthographic Views and vice versa–simple objects.

Introduction to AutoCAD: Basic Display, construction, Editing and dimensioning commands.

TEXTBOOKS

1. K.L.Narayana, S. Bheemanjaneyulu "Engineering Drawing with Auto CAD-2016" New Age InternationalPublishers,1st Edition, 2018.

2. N.D.Bhat,“EngineeringDrawing”,CharotarPublishingHouse,53rdEdition,2014.

REFERENCES

3. K.L.Narayana,P.Kannaiah,“EngineeringDrawing”,SciTechPublishers.2ndEdition,2017

4. K.Venugopal,“EngineeringDrawing”,NewAgeInternationalPublishers,3rdEdition,2014.

5. K.V.Natarajan, “AtextbookofEngineeringGraphics”,DhanalakshmiPublishers,2015.

4. M.S.Kumar,“EngineeringGraphics”,D.D.Publications,2011.

5. Trymbaka Murthy, “Computer Aided Engineering Drawing", I.K. international Publishing House, 3rdEdition, 2011.

E-RESOURCES

1. http://nptel.ac.in/courses/112103019/
2. https://www.slideshare.net/search/slideshow?searchfrom=header&q=engineering+drawing
3. https://www.wiziq.com/tutorials/engineering-drawing
4. http://freevideolectures.com/Course/3420/Engineering-Drawing
5. http://www.worldcat.org/title/journal-of-engineering-graphics/oclc/1781711
6. http://road.issn.org/issn/2344-4681-journal-of-industrial-design-and-engineering-graphics nit jalandhar (EG MECI102)

CO- PO,PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	1		1	-	-	-	-	3	-	3	2	-	-
CO2	3	-	1		1	-	-	-	-	3	-	3	2	-	-
CO3	3	-	1		1	-	-	-	-	3	-	3	2	-	-
CO4	3	-	1		1	-	-	-	-	3	-	3	2	-	-
CO5	3	-	1			-	-	-	-	1	-	1		-	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. II Semester		
Code: D0401	ANALOG ELECTRONICS (Common for EEE & ECE)	L	T	P
Credits: 3		3	-	-

Course Objectives: This course provides the knowledge of Diodes and Transistors, Biasing Techniques, Amplifiers particularly Single Stage Amplifiers and also provides knowledge of study about different amplifiers and understands small signal analysis of different transistor configurations and study about feedback amplifiers and oscillators.

MODULE I: Introduction to Diodes & Transistors **[10 Periods]**

P-N Junction Diode: Diode equation, V-I characteristics, Rectifiers- P-N junction as a rectifier, Half wave rectifier, Full wave rectifier, Bridge rectifier -ripple factor, Rectifiers with Capacitive and Inductive Load, Zener Diode as voltage regulator.

Bipolar Junction Transistor (BJT) & Junction Field Effect Transistor (JFET): Construction, Principle of operation, Common Emitter, Common Base and Common Collector configurations and Input-Output characteristics, JFET-Construction, Principle of operation, V-I characteristics. Introduction to MOSFET: Working Principle of N-channel, P-channel MOSFET.

MODULE II: BJT Biasing & FET Biasing **[10 Periods]**

BJT Biasing: Need for biasing, operating point, load line analysis, bias stabilization techniques: fixed bias, collector to base bias, self-bias, Stabilization against variations in I_{CO}, V_{BE} and β for the self-bias circuit, bias compensation techniques, thermal runaway and thermal stability.

FET Biasing: Biasing techniques: Fixed bias, Source self-bias, Voltage divider bias.

MODULE III: BJT Small Signal Analysis **[10 Periods]**

Small signal low frequency transistor Amplifier circuits: h-Parameter representation of a Transistor, Analysis of single stage transistor Amplifier (CE, CB, & CC) using h-parameters: voltage gain, current gain, input impedance and output impedance. Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance,

MODULE IV: Feedback Amplifiers **[10 Periods]**

Feedback concept and types, Transfer Gain with feedback, General Characteristics of Negative Feedback Amplifiers, Types of Negative Feedback Connections, Method of Identifying Feedback Topology, Stability of Feedback Amplifier.

MODULE V: Oscillators **[10 Periods]**

Constituents of an Oscillator, Barkhausen Criterion, Classification of Oscillators, Sine Wave Feedback Oscillators of LC Type - General Form of Oscillator Circuit, Hartley Oscillator, Colpitts Oscillator Sine Wave Feedback Oscillator of RC type - RC Phase Shift Oscillator, Wein Bridge Oscillator, Crystal Oscillator, Frequency Stability.

Text Books:

1. Jacob Milliman, Christos C.Halkias, SatyabrataJit, "ElectronicDevices and Circuits", McGrawHill (India), 3rd edition, 2013.
2. Shalivahana, N.Suresh Kumar, A.Vallavaraj, "Electronic Devices and Circuits", Tata Mc Graw Hill (India), 3rd edition, 2007.

Reference Books:

1. Robert Boylestad, Lowis Nashelsky, "Electronic Devices and Circuit Theory", Prentice Hall of India, 5th Edition, 1993.
2. G.K.Mithal,"ElectronicDevicesandCircuits",KhannaPublications,22nd Edition,1999.

E-Resources:

1. http://electronicsforu.com/
2. http://www.elektormagazine.com/
3. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?reload=true&punumber=101
4. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=16
5. http://nptel.ac.in/courses/117101106/6

Course Outcomes:

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

2. Understand the basic concepts of Diodes & Transistors and their applications
3. Study different biasing techniques and design the DC bias circuits using BJT & FET
4. Understand the small signal analysis of different transistor configurations.
5. Understand the design of Feedback amplifiers and their frequency response.
6. Understand the design of various oscillators, such as RC Phase Shift Oscillator, Wein Bridge Oscillator, Crystal Oscillator, LC Oscillator, etc

CO-PO, PSO Mapping (3/2/1indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	**Programme Outcomes (POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	1	1	2	2	1	-	1	-	3	2	3	3	2
CO2	2	3	1	2	2		2	-	2	-	1	1	3	2	2
CO3	3	2		1	1	2	1	-	2	-	2	2	2	3	2
CO4	2	3	2	1	2	2	1	-	3	-	2	3	3	2	2
CO5	1	2	2	3	2	3	3	-	2	-	2	3	2	2	3

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B. Tech. II Semester		
Code: D0B09	Applied Physics Lab	L	T	P
Credits: 1	Common to: EEE, ECE, CSE	-	-	3

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, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
3. Able to measure the characteristicsof dielectric constant of a given material.
4. Studythe behavior of B-H curve of ferromagnetic materials.
5. 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 optoelectronics.
3. Gainthe knowledge of applications of dielectric constant.
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. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
3. Characteristicsofseries and parallel LCR circuits.
4. V-Icharacteristics of a p-n junction diode and Zener diode
5. Input and output characteristics of BJT (CE, CB & CC configurations)
6. a) V-I and L-I characteristics of light emitting diode (LED)
   b) V-I Characteristics of solar cell
7. Determination of Energygap of a semiconductor.
8. Determination ofthe resistivityof semiconductor bytwo probemethod.
9. StudyB-H curve of a magnetic material.
10. Determination of dielectric constant of a given material
11. a) Determination ofthe beamdivergence of the given LASER beam

b) Determinationof Acceptance Angle and Numerical Aperture of an optical fiber.

12. Understanding themethodofleastsquares—torsionalpendulum as an example.

Note: Any 8 experiments are to be performed.

REFERENCE BOOK:

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

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COS	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	3	-	2	-	-	-	-	-	-	-	-
CO2	2	2	-	2	-	-	-	-	-	-	-	-
CO3	1	2	-	1	-	-	-	-	-	-	-	-
CO4	3	2	-	2	-	-	-	-	-	-	-	-
CO5	2	1	-	2	-	-	-	-	-	-	-	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B. Tech. II Semester		
Code: D0B11	Engineering Chemistry Lab Common to: EEE, ECE, CSE	L	T	P
Credits: 1		-	-	2

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

- Estimation of hardness and alkalinity in water to check its suitability for domestic and industrial purpose.
- Students are able to perform the estimations of acids and bases using conductometry, potentiometry and pH metry methods.
- Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.
- Students will learn to prepare polymers such as Bakelite in the laboratory.
- Construction of fuel cell and its applications virtually.

List of Experiments:

1. Calibration of Volumetric apparatus.
2. Estimation of Total Hardness of water by EDTA Method.
3. Estimation of an acid by pHmetry.
4. Estimation of strength of an acid by Conductometry.
5. Estimation of strength of an acid by Potentiometry.
6. Determination of viscosity of given liquids by Ostwald's Viscometer.
7. Determination of surface tension of given sample using Stalagmometer.
8. Estimation of iron (II) by Dichrometry.
9. Estimation of acid value of given lubricant oil.
10. Preparation of Bakelite rubber.

Virtual lab experiments:

11. Construction of fuel cell and it's working.
12. Smart materials for biomedical applications.

Reference Books:

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022).
2. Vogel's text book of practical organic chemistry 5th edition.
3. College Practical Chemistry by V. K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

Course Outcomes with BLOOM's

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

	Course Outcome	Bloom's Taxonomy Level
CO1	Analyze the hardness of given water samples from different places.	Analyze **(L4)**
CO2	Apply the various instrumental techniques such as conductometry, potentiometry and pH metry to find out the concentrations or equivalence points of acids and bases.	Apply**(L3)**
CO3	Analyze the surface tension, acid value and viscosity of given lubricant oils.	Analyze **(L4)**
CO4	Understand the preparation of polymeric materials like Bakelite.	Understand**(L2)**
CO5	Understand the Construction of fuel cell and it's working. and Smart materials for biomedical applications .	Understand**(L2)**

CO- PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	3	-	-	-	-	-	-	-	-
CO2	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	2	1	-	-	-		-	-	-	-	-	-	-	-
CO5	2	1	2	-	-	-	1	-	-	-	-	-	-	-	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech II Semester		
Code: D0505	**Basic Python Programming Laboratory (Common for ECE, EEE, Civil and Mechanical)**	**L**	**T**	**P**
Credits: 1		**-**	**-**	**2**

Prerequisites: Programming for Problem Solving

Course Objectives:

□ To install and run the Python interpreter
□ To learn control structures.
□ To Understand Lists, Dictionaries in python
□ To Handle Strings and Files in Python

Software Requirements: Python

List of Programs:

1. a) Write a program to demonstrate different number data types in Python.
   b) Write a program to perform different Arithmetic Operations on numbers in Python.
2. a) Write a program to create, concatenate and print a string and accessing sub-string from a given string.
   b) Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST 2017"
3. Write a program to create, append, and remove lists in python.
4. Write a program to demonstrate working with tuples in python.
5. Write a program to demonstrate working with dictionaries in python
6. a) Write a python program to find largest of three numbers.

   b) Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [Formula: c/5 = f-32/9]

7. a) Write a Python script that prints prime numbers less than 20.

   b) Write a python program to find factorial of a number using Recursion

8. a) Write a python program to define a module to find Fibonacci Numbers and import the module to another program.

   b) Write a python program to define a module and import a specific function in that module to another program.

9. a) Write a program that defines and print a matrix.

   b) Write a program to perform addition of two square matrices.

   c) Write a program to perform multiplication of two square matrices.

10. a) Write a function dups to find all duplicates in the list.
    b) Write a function unique to find all the unique elements of a list
11. a) Write a program to print each line of a file in reverse order.
    b) Write a program to compute the number of characters, words and lines in a file.

12. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.

TEXT BOOKS

1. Supercharged Python: Take your code to the next level, Overland

2. Learning Python, Mark Lutz, O'reilly

REFERENCE BOOKS

1. Python for Data Science, Dr. Mohd. Abdul Hameed, Wiley Publications - 1st Ed. 2021.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
3. Python Programming: A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
4. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
5. Think Python, Allen Downey, Green Tea Press
6. Core Python Programming, W. Chun, Pearson
7. Introduction to Python, Kenneth A. Lambert, Cengage
8. Python Programming, Raghunadh P. and Rajaram J, First Edition, AP, 2024

Course Outcomes:

After completion of the course, the student should be able to:

1. Develop the application specific codes using python.
2. Understand Strings, Lists, Tuples and Dictionaries in Python
3. Verify programs using modular approach, file I/O

CO- PO,PSO Mapping															
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	**Programme Outcomes (POs)**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	-	3		1	-	-	-		-	-	-	2	1	-
CO2	-	-	2	1	1	-	-	-	-	-	-	1	1	-	-
CO3	-	-	2	1	1	-	-	-	-	-	-	1	-	-	2

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. II Semester		
Code: C0402	**ANALOG ELECTRONICS LAB** (Common for EEE & ECE)	**L**	**T**	**P**
Credits: 1		**-**	**-**	**2**

Course Objectives: To design different amplifiers, Feedback amplifiers and Oscillator circuitsaccording to the given specifications.

PART - A: Implement the following Simulation using Multisim or Any equivalent open source software

1. Common Collector Amplifier
2. Common Source Amplifier.
3. Current Series Amplifier
4. Voltage Shunt Feedback Amplifier
5. Wein Bridge Oscillator using Transistors.
6. Hartley and Colpitts's Oscillator Using Transistors.

PART - B: To be performed Using Discrete Electronic Components

1. VI Characteristics of PN Junction and Zener Diodes
2. Full Wave Rectifier without and with Load
3. VI Characteristics of Common Emitter Configuration
4. Common Emitter Amplifier.
5. Voltage Series Amplifier.
6. RC Phase Shift Oscillator using Transistors.

Course Outcomes:

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

1. Design Amplifiers Circuits.
2. Design Oscillator Circuits.
3. Analyze Feedback topology for amplifiers.

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12	PSO 1	PSO2	PSO3
CO1	2	3	3	3	3	-	2	-	-	1	1	2	3	3	1
CO2	2	3	3	3	3	-	2	-	-	1	1	2	3	3	1
CO3	2	3	3	3	2	-	1	-	-	1	-	2	3	3	1

SEMESTER - III

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. III Semester		
Code:D0B03	Complex Variables and Numerical Methods (Common for EEE & ECE)	L	T	P
Credits:3		3	-	-

Prerequisites: Differentiation, Partial differentiation, Integration

Course Objectives: To Learn

1) Continuity, derivability of a function, harmonic function and Milne Thomson Method.
2) Evaluation of line integral of a function of complex variable using Cauchy's Integral formula and verify Cauchy's Integral theorem.
3) Power series expansions of complex functions and Evaluation of contour integrals.
4) Interpolation and Solution of algebraic and transcendental equations.
5) Numerical solution of ordinary differential equations and Numerical Integration.

MODULE I: Functions of Complex variable [9 Periods]

Introduction, Limit, Continuity and Differentiation of complex functions, Cauchy-Riemann equations (without proof), analytic functions, harmonic functions, finding harmonic conjugate, Milne – Thompson method. Elementary analytic functions (exponential, trigonometric and logarithm) and their properties, Conformal mappings, Mobius Transformations.

MODULE II: Complex Integration [8 Periods]

Line integral, Evaluation along a path and by indefinite integration, Cauchy's integral theorem, Cauchy's integral formula, Generalized Cauchy's integral formula. (All theorems without Proof).

MODULE III : Power series expansions of complex functions & Contour Integration [10 periods]

(A) Radius of convergence, Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point, Isolated singular point, pole of order m, Essential singularity.

(B) Residue, Evaluation of residue by formula and by Laurent series, Cauchy's Residue theorem, Evaluation of integrals by indentation improper real integrals (a) $\int_{-\infty}^{\infty} f(x)dx$ (poles not on the real axis) (b) $\int_{0}^{2\pi} f(\cos\theta, \sin\theta)d\theta$ (All theorems without Proof).

MODULE IV: Algebraic, transcendental equations and Interpolation [11 periods]

Algebraic and Transcendental Equations: Introduction, Bisection Method, Method of False Position. The Iteration Method,Newton-Raphson Method, Jacobi's Iteration Method, Gauss Seidel Method.

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

MODULE – V: Numerical Integration and Numerical solution of Ordinary Differential Equations [10 periods]

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

Numerical Solution of Ordinary Differential Equations: Introduction, Solution by Taylor's series method, Picard's Method of Successive Approximations, Euler's Method, Modified Euler's Method, Runge-Kutta method of 4^{th} order for first order O.D.E.

Text Books:

1) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2) R K Jain SRK Iyengar ,Advanced engineering mathematics, Narosa publications.
3) M . K Jain, S R K Iyengar, R.K Jain, Numerical Methods for Scientific and Engineering Computation, New age International publishers.
4) J.W.Brown and R.V.Churchill, Complex Variables and Applications, 7th Edition, Mc-Graw Hill,2004.

Reference Books:

1) Murray Spiegel, Complex variables by Schamus outlines series.
2) Erwin Kreyszig, Advanced Engineering Mathematics, Wiley publications.
3) S.S.Sastry, Introductory Methods of Numerical Analysis,5th Edition,PHI Learning Private Limited

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

1) Apply the conditions for a complex variable function to be analytic and/or harmonic and to construct an Analytic function and understand bilinear transformation.
2) Apply Cauchy's Integral theorem and Cauchy's Integral formula to evaluate complex integrals.
3) Expand a given function as a Taylor's or Laurent's series and evaluate contour integrals.
4) Find the solution of a given equation by various methods and find the unknown value for the given data using interpolation.
5) Evaluate the integrals and find the numerical solutions for a given ODE's using numerical techniques.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3	3	-	-	-	2	-	-	1	3	2	2
CO2	2	2	2	3	2	-	-	-	2	-	-	1	2	2	2
CO3	2	2	2	3	2	-	-	-	2	-	-	1	2	2	2
CO4	3	2	2	3	3	-	-	-	2	-	-	2	3	2	2
CO5	2	2	2	3	3	-	-	-	2	-	-	2	2	2	2

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. III Semester		
Code: D0403	DIGITAL ELECTRONICS	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course Objectives:

This course introduces various number systems and conversion from one number system to other and also to understand different binary codes**,** the theory of Boolean algebra and to study representation of switching functions using Boolean expressions and their minimization techniques. Understanding the combinational logic design of various logic and switching devices and their realization**,** the basic flip flops and sequential logic circuits design both in synchronous and Asynchronous modes for various complex logic and switching devices, their minimization techniques and their realizations and to analyze a given sequential circuit by using state tables and state diagrams.

MODULE I Number systems& Binary codes 8 Periods

Number systems: Number Systems, Radix conversions, complement of numbers.

Binary codes: Binary codes, Weighted and non-Weighted codes, BCD code, gray code, excess 3 codes - Error detecting code, Error Correcting code, Hamming Code.

MODULE II Boolean Algebra& Boolean functions 10 Periods

Boolean Algebra: Postulates and Theorems - Canonical and Standard forms: SOP and POS forms, Minterms and Maxterms –Logic gates: NOT, OR, AND, NOR, NAND, XOR, XNOR - Universal gates

MODULE III Combinational Logic Circuits 10 Periods

A:Arithmetic circuits: Half adder, full adder, half subtractor, full subtractor, binary adder, Carry look ahead adder, BCD adder

B:Code conversion circuits, Comparator, Decoder, Encoder, Priority Encoder, Multiplexers and Design, De – Multiplexers, ROM, PLA, PAL.

MODULE IV Sequential Logic Circuits - I 10 Periods

Introduction –Latches and Flip flops: Basic Flip flop circuit, RS, D, JK and T Flip-flops – Triggering of Flip flops: Master Slave Flip flop, edge triggered flip flop – Conversion of one type of Flip flop to another,Setup time, hold time.

Registers and Counters: Shift Register, Universal Shift Register, Applications of Registers, Asynchronous counter, Synchronous counter, Mod-N Counter, binary up/down counter, Ripple counter, Johnson counter.

MODULE IV Sequential Logic Circuits - II 9 Periods

Analysis of Sequential Logic circuit: State Diagram, state table, reduction of state table, state Assignment –- Design procedure of sequential circuits using state diagram, state table and Flip flops. Example design Sequence detector.

Finite State Machine: Introduction, FSM capabilities and Limitations, Mealy and Moore models – minimization of completely specified and incompletely specified sequential Machines. Partition techniques and Merger charts

Text Books

1. ZviKohavi, **"Switching and Finite Automata Theory"**,TMH, 2nd edition, 2006.
2. Morris Mano,**"DigitalDesign"**,PHI, 3rd Edition, 2009.
3. A.AnandKumar,**"Switching Theory and Logic Design"**,PHI 2nd Edition, 2014.
4. John F.Wakerly, **"Digital Design Principles & Practices"**, PHI/ Pearson Education Asia, 3rd Ed., 2005.

References

1. Stephen Brown and ZvonkaVramesic, **"Fundamentals of Digital Logic with VHDL Design"**,McGraw Hill, 2nd Edition, 2008.
2. William I. Fletcher, **"An Engineering Approach to Digital Design"**, PHI, 1st Edition, 2009.

E- Resources

1. https://www.researchgate.net/publication/264005171_Digital_Electronics
2. https://www.cl.cam.ac.uk/teaching/0708/DigElec/Digital_Electronics_pdf.pdf
3. http://ieeexplore.ieee.org/abstract/document/753678/
4. http://docshare01.docshare.tips/files/20257/202573063.pdf
5. http://nptel.ac.in/courses/117106086/1
6. http://nptel.ac.in/courses/117105080/
7. http://nptel.ac.in/courses/117106114/

Course Outcomes

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

1. Perform radix conversions
2. Minimize a given boolean function by using k-map or tabular method
3. Design a combinational circuit
4. Design a sequential circuit by using various flipflops
5. Analyze and minimize the circuitry of a given sequential circuit and will be able to design a sequence detector

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. III Semester		
Code: D0314	SOLID MECHANICS AND HYDRAULIC MACHINES (Common for EEE and Min.E.)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives:

The objective of this subject is to provide the knowledge of fluid power and analyze the performance of various hydraulic machines like turbines, compressors and pumps.

MODULE I: Fluid statics **10 Periods**

Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Piezometer, U-tube and differential manometers.

Hydro static forces on plane and curved surfaces. Buoyancy and floatation: Meta center, stability of floating body, Submerged bodies, Calculation of metacentric height.

MODULE II: Fluid Kinematics & Fluid Dynamics **10 Periods**

Fluid kinematics: Stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform & non uniform, laminar & turbulent, rotational and irrotational flows-equation of continuity for one dimensional flow. Velocity potential and stream function – flow net.

Fluid dynamics : Surface and body forces –Euler‘s and Bernoulli‘s equations for flow along a stream line, Measurement of flow: pitot tube, venturimeter and orifice meter, Flow nozzle, Turbine flow meter, momentum equation and its application on pipe bend.

MODULE III: Closed Conduit Flow & Boundary Layer Concepts **10 Periods**

A: Closed conduit flow: Reynold‘s experiment- Darcy Weisbach equation- Minor losses in pipe pipes in series and pipes in parallel - total energy line - hydraulic gradient line.

B: Boundary Layer Concepts: Definition, thickness, characteristics along thin plate, laminar and turbulent boundary layers (No derivation) boundary layer in transition, separation of boundary layer, submerged objects – drag and lift.

MODULE IV: Turbo machinery and Hydraulic Turbines **09 Periods**

Basics of turbo machinery: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, workdone and efficiency, flow over radial vanes.

Hydraulic Turbines : Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, workdone, efficiencies, hydraulic design – draft tube theory - functions and efficiency. Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

MODULE V: Centrifugal Pumps & Reciprocating Pumps **09 Periods**

Centrifugal pumps: Classification, working, workdone – manomertic head- losses and efficiencies specific speed- pumps in series and parallel-performance characteristic curves, NPSH. Reciprocating pumps: Working, Discharge, slip, indicator diagrams.

Text Books

1. Modi and Seth, "**Hydraulics, fluid mechanics including hydraulic machines**", Standard Publishers, 19th Edition, 2013
2. R.K. Bansal, "**Fluid Mechanics and hydraulic Machines**", Laxmi Publications, 9th Edition, 2010.

References

1. R.K. Rajput, "**Fluid Mechanics and Hydraulic Machines**", S.Chand, 5th Edition, 2013.
2. D. Rama Durgaiah, **"Fluid Mechanics and Machinery"**, New Age International (P) Ltd, 1st editions, 2007
3. James W. Dally, William E. Riley **"Instrumentation for Engineering Measurements",** John Wiley & Sons Inc. 3rd editions, 1989.
4. Vijay Gupta and S.K.Gupta, "**Fluid Mechanics and Applications**", New-Age International Ltd. 1999.
5. Banga & Sharma, "**Hydraulic Machines**", Khanna Publishers, 7th Edition, 2007

E - Resources

1. nptel.ac.in/courses/112105183/
2. www.nptelvideos.in/2012/11/fluid-mechanics.htm
3. nptel.ac.in/courses/112104117/
4. www.sanfoundry.com/best-reference-books-fluid-mechanics-and-machinery/
5. https://www.elsevier.com/journals
6. nptel.ac.in/courses/112105183/

Course Outcomes:

1. Know the dimension and units of fundamental properties.
2. Understand the concept of fluid kinematics and dynamics.
3. Understand and solve the problems of closed conduit flow & boundary layer concepts.
4. Analyze the performance of turbo machinery and hydraulic turbines.
5. Understand the principles of centrifugal and reciprocating pumps.
6. Know the dimension and units of fundamental properties.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	3	2	1	-	-	-	-	-	3	-	-	-
CO2	3	3	-	3	2	1	-	-	-	-	-	3	-	-	-
CO3	3	3	-	3	2	1	-	-	-	-	-	3	-	-	-
CO4	3	3	-	3	2	1	-	-	-	-	-	3	-	-	-
CO5	3	3	-	3	2	1	-	-	-	-	-	3	-	-	-

20224-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. III Semester		
Code: D0205	ELECTRICAL CIRCUIT ANALYSIS AND SYNTHESIS	L	T	P
Credits: 3		2	1	-

Prerequisites: Basic Electrical and Electronics Engineering

Course Objectives: This course deals about the network theorems and three phase circuits. It also emphasis on network parameters, synthesis and transient analysis of electrical network. It is the foundation for all courses of the Electrical and Electronics Engineering discipline.

MODULE I Network Theorems (AC and DC) 10 Periods

Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation and Tellegen's theorems - Statement of theorems and numerical problems

MODULE II Resonance and Three Phase Circuits 12 Periods

Resonance: Resonance – Series & parallel circuits, concept of bandwidth and Q factor.

Locus diagrams: Series R-L, R-C, R-L-C Circuits.

Three Phase Circuits: Introduction to three phase circuits – types of connection - Star and delta– Relation between line and phase voltages and currents in balanced systems – Analysis of balanced and Unbalanced three phase circuits.

MODULE III Two Port Network Parameters 13 Periods

A: Open circuit impedance (Z) network parameters, Short circuit admittance(Y) network parameters –Transmission (ABCD)

B: Inverse Transmission ($A^1B^1C^1D^1$) and Hybrid parameters – Relationship between two port network parameters – Reciprocity and Symmetry concepts of two port network parameters.

MODULE IV Transient Analysis (Both AC & DC Networks) 13 Periods

Introduction - Initial conditions of all elements-Transient response of Series R-L, R-C and R-L-C circuits (Independent Sources Only) – Solution using Laplace transform approach.

MODULE V Network Synthesis 13 Periods

Hurwitz Polynomials, Positive Real Functions, Frequency Response of Reactive One-Port network, Synthesis of Reactive One Port by Foster's Method, Synthesis of Reactive One Port By Cauer Method, Synthesis of RL, RC and LC One Port Networks by Foster and Cauer Methods.

Text Books

1. William H. Hayt and Jack E. Kimmerly, **"Engineering Circuit Analysis"**, McGraw Hill Company, 6th Edition, 2005.
2. Joseph Edminister and Mahmood Nahvi, **" Electric Circuits"**, Schaum Outline Series, Tata McGraw Hill, 3rd Edition, 1999.

References

1. Vanvalken burg, "**Network Analysis**", Prentice Hall of India, 3 rd Edition, 1994.
2. A. Chakrabarthy, "**Circuit Theory**", Dhanpat Rai & Co., 6 th Edition, 2010.
3. N. N. Parker Smith, "**Problems in Electrical Engineering**", Prentice Hall of India, 9th Edition, 1981.
4. Sudhakar A. and Shyammohan S.P., "**Circuits and Networks: Analysis and Synthesis"**, Tata McGraw Hill, New Delhi, 2004.
5. Arumugam M. and Premkumar N., **"Electric Circuit Theory"**, Kanna Publishers, New Delhi, 1991.

E - Resources

1. http://www.ece.ucsb.edu/Faculty/rodwell/Classes/ece2c/resources/two_port.pdf
2. http://nptel.ac.in/courses/117106108/
3. http://nptel.ac.in/courses/108102042/

4. https://www.vssut.ac.in/lecture_notes/lecture1423722706.pdf

Course Outcomes

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

1. Analyze electrical circuits using network theorems and magnetic circuits.
2. Apply the concepts of three phase electrical circuits to electrical machines and power systems and understand the resonance concepts.
3. Evaluate the different parameters of a given two port electrical network.
4. Analyze the transient response of a network for the given input.
5. Construct the electrical circuit for the given impedance, admittance functions.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. III Semester		
Code: D0206	ELECTROMAGNETIC FIELDS	L	T	P
Credits: 3		3	-	-

Prerequisites: Applied Physics.

Course Objectives: This course deals about the electrostatics, electric potential, energy density and their applications. It emphasis on magneto statics, magnetic flux density scalar and vector potential and its applications. It also deals with the time varying fields along with their mathematical formulations.

MODULE I Introduction to Electrostatics 10 Periods

Sources and effects of electromagnetic fields – Vector fields – Different co-ordinate systems– Divergence theorem –Stroke's theorem. Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge –Electric Potential– Properties of potential function – Potential gradient – Gauss' s law – Application of Gauss's Law – Maxwell's first law. Laplace's and Poison's equations – Solution of Laplace's equation in one variable.

MODULE II Conductors, Dielectric & Capacitance 10 Periods

Electric dipole – Dipole moment – potential and EFI due to an electric dipole. Conductors and Insulators. Introduction to permanent magnets, their characteristics and applications. Electric field inside a dielectric material – polarization – Dielectric – Conductor and Dielectric – Dielectric boundary conditions, Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity.

MODULE III Magneto Statics, Ampere's Circuital Law 10 Periods

A: Static magnetic fields – Biot-Savart's law – Oesterd's experiment - Relation between magnetic flux, magnetic flux density and Magnetic field intensity (MFI) – MFI due to a straight current carrying filament

B: MFI due to circular, square and solenoid current – Carrying wire –and MFI – Maxwell's second Equation. Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Maxwell's third equation.

MODULE IV Force in Magnetic Fields, Magnetic Potential 9 Periods

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field.Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – vector Poisson's equations.

MODULE V Inductance, Time Varying Fields 9 Periods

Self and Mutual inductance – Neumann's formulae – determination of self-inductance of a solenoid, toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field. Time varying fields – Faraday's laws of electromagnetic induction – Maxwell's fourth equation – Statically and Dynamically induced EMFs – Simple problems -Modification of Maxwell's equations for time varying fields – Displacement current – Poynting Theorem and Poynting vector.

Text Books

1 William H. Hayt& John. A. Buck, **"Engineering Electromagnetics"**, McGraw-Hill Companies, 7th Edition, 2012.

2 Mathew N. O. Sadiku, **"Principles of Electromagnetics"**, Oxford University Press Inc. 4th Edition, First India Edition, 2009.

References

1. J P Tewari, **" Electromagnetics"**, Khanna Publishers, 2nd Edition, 2005.
2. J. D Kraus,**"Electromagnetics"**, Mc Graw-Hill Inc, 4th Edition, 1992.
3. S. Kamakshaiah, **"Electromagnetic Fields"**, Right Publishers, 2007.
4. K.A. Gangadhar, P.M. Ramanathan, **"Electromagnetic Field Theory (Including Antennas and Wave Propagation)"**, Khanna Publications, 16th Edition, 2007**.**
5. Bhag Singh Guru and Hüseyin R. Hiziroglu, **"Electromagnetic Field Theory Fundamentals"**, Cambridge University Press, 2nd Revised Edition, 2009.

E - Resources

1. http://www.tandfonline.com/toc/tewa20/current
2. https://www.eeweb.com/passives
3. nptel.ac.in/courses/108106073/

Course Outcomes

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

1. State and apply the laws of electromagnetic fields to practical circumstances.
2. Determine the electric field intensity resulting from various configurations of charge distribution.
3. Analyze the concepts of magneto static field and solve the magneto static field problems using laws associated with it.
4. Apply the concept of magnetic fields to compute magnetic potential in scalar and vector forms.
5. Apply the concept of electro dynamic fields and analyze the behavior of conductors using laws associated with it.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. III Semester		
Code: D0561	FUNDAMENTALS OF DATA STRUCTURES LAB (Common for CE, EEE, ME, ECE, MiE)	L	T	P
Credits: 2		-	1	2

Prerequisites: C Programming.

Course Objectives:

This course will deliver the knowledge in introducing the concepts of various data structures such as linked lists, stacks, queues, trees and graphs along with the applications.

Software Requirements: Turbo C / C++

List of Programs:

1 Write a program to perform the following operations on matrix
   a) Addition
   b) Subtraction
   c) Multiplication

2 Write a program to create one dimensional array, with the following operations:
   a) Insertion
   b) Deletion
   c) Display the elements
   d) Count number of elements

3 Write a program to create a single linked list, with the following operations:
   a) Insertion
   b) Deletion
   c) Display the elements
   d) Count number of elements.

4 Write a program to create a circular linked list, with the following operations:
   a) Insertion
   b) Deletion
   c) Display the elements
   d) Count number of elements.

5 Write a program to create a double linked list, with the following operations:
   a) Insertion
   b) Deletion
   c) Display the elements
   d) Count number of elements.

6 Write a program to implements stack operations using Arrays

7 Write a program to implements stack operations using Linked list

8 Write a program to implements Linear Queue operations using Arrays

9 Write a program to implements Linear Queue operations using Linked list

10 Write a program to implements Circular Queue operations using Arrays

11 Write a program to implements Double-ended Queue operations using Arrays

12 Write a program to create a Binary Search Tree (BST) and perform insert and search operations on it.

TEXTBOOKS

1. Jean Paul Tremblay, Paul G Sorenson, "**An Introduction to Data Structures with Applications**", Tata McGraw Hills, 2nd Edition, 1984.
2. Richard F. Gilberg, Behrouz A. Forouzan, "**Data Structures: A Pseudo code approach with C** ", Thomson (India), 2nd Edition, 2004.

REFERENCES

1. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, "**Fundamentals of Data Structure in C**", University Press (India), 2nd Edition, 2008..
2. A. K. Sharma, "**Data Structures using C**", Pearson, 2nd Edition, June, 2013.
3. R. Thareja, "**Data Structures using C**", Oxford University Press, 2nd Edition, 2014.

Course Outcomes:

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

1. Identify the appropriate recursive algorithms and analyze the performance of algorithms.
2. Understand and implement single, double, and circular linked-lists.
3. Implement linear data structures such as Stacks and Queues using array and linked-list representations.
4. Implement non linear data structures such as trees and graphs.

CO-PO MAPPING

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	ProgrammeOutcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	-	-	-	-	-	-	-	-	-	3	2	-
CO2	2	2	3	-	-	-	-	-	-	-	-	-	2	3	-
CO3	-	2	3	-	-	-	-	-	-	-	-	-	-	3	1

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. III Semester		
Code: D0407	DIGITAL ELECTRONICS LAB	L	T	P
Credits: 1		-	-	2

Course Objectives:

To get programming knowledge on Verilog/VHDL programming of different digital circuits and CMOS circuits.

List of Experiments:

Introduction to Verilog/VHDL and Design of all the logic gates

1. Design of Half adder, Full adder using 3 modeling styles
2. Design of Half Subtractor, Full Subtractor using 3 modeling styles
3. Design of 4X16 Decoder using two 3x8 Decoders
4. Design of 8-to-3 encoder (without and with priority).
5. Design of Multiplexer &Demultiplexer.
6. Design of comparator
7. Design of 4-bit binary to gray converter viceversa,
8. Design of BCD to Excess-3 code converter and viceversa
9. Design of flip flops: SR, D, JK, T.
10. Design of 4-bit binary up/down counter.
11. Design of Johnson counter.

Equipment required for laboratory

1. Computers – Dual Core.
2. Software – Verilog/VHDL or any equivalent software

Course Outcomes:

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

1. To develop the Verilog/VHDL code.
2. Design basic combinational circuits.
3. Design flipflops, basic sequential circuits.

Xx

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. III Semester		
Code: D0207	ELECTRICAL CIRCUITS LAB	L	T	P
Credits: 2		-	-	4

Course Objectives:

To impart hands on experience in verification of circuit laws and theorems, measurement of circuit parameters, study of circuit characteristics and simulation of time response.

List of Experiments:

1. Verification of Thevenin's & Norton's Theorems.
2. Verification of maximum Power Transfer Theorem for the Given 'T' Network.
3. Verification of Super Position Theorem.
4. Verification of Compensation Theorem.
5. Verification of Reciprocity Theorem for DC Excitation.
6. Experimental determination of Quality Factor, Bandwidth and resonant frequency.
7. Experimental Determination of Z & Y Parameters.
8. Experimental determination of Transmission & Hybrid Parameters for the given two port network.

Simulation Experiments:

9. Determination of branch currents in a given electrical circuit.
10. Determination of node voltages of a given electrical network.
11. Determination of transient response of a given RL & RC Circuit.
12. Determination of load current and voltage for a given electrical Network.

Course Outcomes

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

1. Reduce the given complex circuit to simple circuit by applying theorems and can verify the theoretical and practical outputs.
2. Find the impedance value of the given circuit at which the maximum power is transferred and also confirms with the practical results.
3. Design a circuit to accept or reject a particular frequency using resonance principle.
4. Estimate the parameters of the given network.
5. Find the magnitudes of voltages and currents in the given circuit.

CO-PO Mapping

CO- PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	ProgrammeOutcomes(POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	3	-	-	3	1	-	1

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. III Semester		
Code: D00M2	ENVIRONMENTAL SCIENCE	L	T	P
Credits: NIL		2	-	-

Prerequisites: Nil

Course Objectives:

An interdisciplinary approach to complex environmental problems using basic tools of the natural and social sciences, including geo systems, biology, chemistry, economics, political science and international processes. The ability to work effectively as a member of an interdisciplinary team on complex problem of environment.

Module I: Ecosystems 5 Periods

Definition, Scope and Importance of ecosystem, Concept of ecosystem, Classification of ecosystems, Structure and Structural Components of an ecosystem, Functions of ecosystem, Food chains,foodwebs and ecological pyramids. Flow of energy.

Activity: Plantation.

Module II: Natural resources, Biodiversity and Biotic resources 9 Periods

A: Natural Resources:

Classification of Resources: Living and Non-Living resources, Renewable and non-renewable 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–case studies. Energy resources: growing energy needs, introduction to renewable and non renewableenergy sources.

B: Biodiversity and Biotic resources:

Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and intrinsic values. Threats to Biodiversity (habitat loss, poaching of wildlife, man-wild life conflicts). Conservation of Biodiversity (In-situ and Ex-situ conservation),

Activity: case studies.

Module IIIEnvironmentalPollution AndControl 7 Periods

A: Classification of pollution and pollutants, Causes, effects and control technologies. Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Point and non-point sources of pollution, Major pollutant of water and their sources, drinking water quality standards.

B: Soil Pollution, Soil as sink for pollutants, Impact of modern agriculture on soil, degradation of soil. Marine Pollution: Misuse of International water for dumping of hazardous waste, Coastal pollution due to sewage and marine disposal of industrial effluents. E-waste and its management. Activity: Field visit.

Module IV Global Environmental Problems and Global effects 6 Periods

Green houseeffect, Green House Gases (GHG), Global Warming, Sea level rise, climate change and their impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions/Protocols: Earth summit, Kyoto protocol and Montréal Protocol.

Activity: Poster Making.

Module V Towards sustainable future 5 Periods

Concept of Sustainable Development, Threats to Sustainability, Population and its explosion, Crazy Consumerism, Over-exploitation of resources, Strategies for Achieving Sustainable development, Environmental Education, Conservation of Resources, Urban Sprawl, Sustainable Cities and Sustainable Communities, Human health, Role of IT in Environment, Environmental Ethics, Environmental Economics, Concept of Green Building, Clean Development Mechanism(CDM).

Text Books

1. R.Rajagopalan,**"Environmental Studies from crisis to cure"**, Oxford University Press 2nd Edition, 2005.
2. Anubha Kaushik, C.P.Kaushik, **"Environmental studies"** New age International Publishers,4th Edition,2012

References

1. ErachBharucha,**"Environmental studies"** University Grants Commission, and University Press,I Edition, 2005.
2. M. Anji Reddy **"Text book of Environmental Science and Technology"** 3rd Edition, 2007
3. Richard T.Wright,**"Environmental Science: towards a sustainable future"** PHL Learning, Private Ltd. New Delhi, 2nd Edition., 2008
4. Gilbert McMasters and Wendell P.Ela,**"Environmental Engineering and science"**,3rd Edition, PHI Learning Pvt. Ltd.,2008.

E- Resources

1. http://www.gdrc.org/uem/ait-terms.html (Glossary of Environmental terms).
2. http://www.environmentalscience.org/ (Environmental sciences Lectures series).
3. Journal of earth science and climatic change (OMICS International Journal).
4. Journal of pollution effects & control (OMICS International Journal).
5. nptel.ac.in/courses/120108004/ (Principles of Environment Management Lectures).
6. http://www.nptelvideos.in/2012/12/fundamentals-of-environmental-pollution.html(NPTEL online video courses IIT lectures).

Course Outcomes

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

1. To enable the students to realize the importance of ecosystem, its structure, services. To make the students aware of Different natural functions of ecosystem, which helps to sustain the life on the earth.
2. To use natural resources more efficiently.
3. To make the students aware of the impacts of human actions on the environment, its effects and minimizing measures to mitigate them.
4. To educate the students regarding environmental issues and problems at local, national and international level.
5. To know more sustainable way of living

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	1	-	1	2	1	-	-	-	-	-	-	-	-
CO2	2	3	2	3	1	3	-	2	-	-	-	-	-	-	-
CO3	3	3	2	3	2	2	-	1	-	-	-	-	-	-	-
CO4	3	2	2	1	2	1	-	-	-	-	-	-	-	-	-
CO5	2	1	1	-	-	1	3	3	-	-	-	-	-	-	-

SEMESTER-IV

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech IV Semester		
Code:D0H08	BUSINESS ECONOMICS AND FINANCIAL ANALYSIS (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives:

EEA is a think beyond program which will make the student to examine the application of microeconomics theory as applied to the manager's responsibilities in an organization. To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making. This course should emphasize the quantitative and qualitative applications of economic principle to business analysis

MODULE-I Business Environment and Managerial Economics 10 Periods

A. **Business Environment**: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Latest trends in Business Environment (Entrepreneurship).

B. **Managerial Economics:** Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand, Types, Significance of Elasticity of Demand, Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

MODULE – II Theory of Production and Cost Analysis 10 Periods

A. Theory of Production: Production Function – ISOquants and ISOcosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

B. Cost Analysis: Cost concepts, Opportunity cost, fixed vs. Variable costs, explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEA.

MODULE – III Market structures and Pricing Policies 9Periods

A. **Introduction to Markets & Market structures:** Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.

B. **Pricing Policies & Methods:** Cost plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, PLC based pricing methods.

MODULE – IV Capital and Capital Budgeting 9Periods

A. **Capital:** Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.

B. **Capital Budgeting** : Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

MODULE – V Financial Accounting and Ratios 10 Periods

A. **Financial Accounting:** Introduction, Accounting principles, Accounting Cycle, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

B. **Financial Analysis Through Ratios:** Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

Text Books

1. Aryasri, **"Managerial Economics and Financial Analysis"**, TMH, 2nd edition, 2005.
2. Varshney &Maheswari, **"Managerial Economics"**, 5th edition Sultan Chand, 2003.

References

1. H. Craig Peterson & W. Cris Lewis, **"Managerial Economics"**, PHI, 4 Ed.
2. Domnick Salvatore, **"Managerial Economics In a Global Economy"**, Thomson, 4th Edition.
3. Raghunatha Reddy &Narasimhachary, **"Managerial Economics& Financial Analysis"**, 4TH edition Scitech.
4. S.N.Maheswari& S.K. Maheswari, **"Financial Accounting"**, 6th edition Vikas.
5. Dwivedi, **"Managerial Economics"**, Vikas, 6th Edition.

E- Resources

1. http://www.learnerstv.com/Free-Economics-video-lecture-courses.htm
2. http://nptel.ac.in/courses/110105067/
3. http://nptel.ac.in/courses/110107073/
4. http://nptel.ac.in/courses/110101005/
5. http://nptel.ac.in/courses/109104073/

Course outcomes:

After completion of the course, students will be able to:

1. Understand the concepts of managerial economics and their application in evaluating the demand.
2. Evaluate the production function and identifies the least cost combination to control the costs of production.
3. Understand the structures of various market types and their pricing policies.
4. Understand the types of business forms and also be able to evaluate the investments using capital budgeting techniques.
5. Understand the basic concepts of financial accounting and evaluation of company performance using ratio analysis.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	-	-	-	-	-	-	1	-	3	3	-	-	-
CO2	3	-	-	2	1	-	-	-	-	-	-	3	-	-	-
CO3	-	1	-	-	2	-	-	-	-	-	3	3	-	-	-
CO4	2	1	-	-	3	-	-	-	-	-	-	3	-	-	-
CO5	-	1	-	-	2	-	-	-	-	-	3	3	-	-	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech IV Semester		
Code: D0460	SIGNALS AND SYSTEMS	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives:

This course is introducing the basic concepts of signals and introduce the Fourier series for the analysis of periodic signals, the Fourier transform for the analysis of non-periodic signals and familiarize the concept of sampling and different types of sampling techniques. This course also introduces the LTI system and the concepts of convolution and correlation applied for the signal analysis, the concept of Laplace transform, its properties and its applications for continuous time domain signals, the concept of Z- transform, its properties and its applications for discrete time domain signals.

MODULE- 1 Introduction to Signals 10 Periods

Definition, Classification of Signals (continuous - time and discrete - time), Elementary signals (continuous - time and discrete - time).

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.

Fourier series: Overview of Fourier series.

MODULE-II Fourier Transforms &Sampling 10 Periods

Fourier Transforms: Derivation of Fourier Transform from Fourier Series, Existence of Fourier Transform, Fourier Transform of Standard signals, Properties of Fourier Transform, Fourier Transform of periodic signals, and Introduction to Hilbert Transform.

Sampling: Sampling theorem – Graphical and analytical proof for Band Limited Signals, Types of Sampling – Impulse Sampling, Natural and Flat Top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing.

MODULE-III LTI System, Convolution and Correlation 10 Periods

A: Signal Transmission through Linear Systems: System Definition, Classification of systems, Properties of LTI systems, Transfer Function of an LTI system, Filter Characteristics of Linear System, Distortionless Transmission through a system.

B: Convolution and Correlation of Signals: Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution, Convolution property of Fourier Transforms, Cross Correlation and Auto Correlation functions, Properties of Correlation function, Energy density spectrum, Parseval's Theorem

MODULE-IV Laplace Transforms 10 Periods

Unilateral and Bilateral Laplace Transform, Relation between Laplace Transform and Fourier Transform, Laplace Transform of some commonly used signals and its Region of Convergence (ROC), Properties of Laplace Transform, Inverse Laplace Transform, Solution of Differential equations using Laplace Transform, Laplace Transform of signals using waveform synthesis.

MODULE-V Z–Transforms 8 Periods

One sided and Bilateral Z-Transform, Z-Transform of some commonly used signals and its Region of Convergence (ROC), Properties of Z-Transform, Inverse Z-Transform- Long Division, Partial Fraction and Residue Methods.

Text Books

1. B. P. Lathi, **"Signals Systems & Communications"**, BSP, 2nd Edition, 2013.
2. P Ramakrishna Rao and Shankar Parkriya, **"Signals and Systems"**, MGH International, 2nd Edition, 2013.

References

1. A.V. Oppenheim, A. S. Willsky, S.H. Nawab, **"Signals and Systems"**, PHI, 2nd Edition, 2014.
2. A. Anand Kumar, **"Signals and Systems"**, PHI, 3rd Edition, 2013.
3. Simon Haykin and Van Veen, **"Signals & Systems"**, Wiley, 2nd Edition, 2007.

E-Resources

1. http://www.tutorialspoint.com/signals_and_systems/
2. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/lecture-notes/
3. http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?reload=true&punumber=78
4. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=8919
5. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=82
6. http://nptel.ac.in/courses/117104074

Course Outcomes

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

1. Represent any arbitrary signals in terms of complete sets of orthogonal functions and understand the principles of impulse functions, step function and signum function.
2. Express periodic signals in terms of Fourier series and aperiodic signals in terms of Fourier transform.
3. Understand the principle of linear system, filter characteristics of a system and its bandwidth, the concepts of auto correlation and cross correlation and power Density Spectrum.
4. Express continuous time domain signals in terms of Laplace Transform ie. complex frequency domain (s-plain) and waveform synthesis.
5. Express discrete time domain signals in terms of Z-Transform and its Region of Convergence.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. IV Semester		
Code: D0208	POWER GENERATION AND DISTRIBUTION SYSTEMS	L	T	P
Credits: 3		3	-	-

Prerequisites: Engineering Chemistry, Electrical Circuit Analysis and Synthesis

Course Objectives: This course deals about the layout of different types of power stations and various power distribution systems. It also emphasis on the importance of economic aspects & tariff.

MODULE I Power Stations 10 Periods

Thermal Power Stations: Layout of Thermal Power Station (TPS). Brief description of functional parts: Air-preheater, Economizer, Super heater, Boilers, Turbines, Condensers, Cooling towers, Chimney and electrostatic precipitators.

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

MODULE II Hydroelectric and Gas Power Stations 10 Periods

Hydroelectric Power Stations: Elements of hydro electric power station – Types - Concept of pumped storage plants - Storage requirements, mass curve (explanation only) estimation of power developed from a given catchment area - Heads and efficiencies.

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

MODULE III Air & Gas Insulated Substations 9 Periods

A: 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.

B: Introduction to Gas insulated substations, Single line diagram of gas insulated substations, bus bar, Construction aspects of GIS, Maintenance and Advantages of GIS, Comparison of Air insulated substations and Gas insulated substations.

MODULE IV D.C. and A.C Distribution Systems 10 Periods

Classification of Distribution Systems - Comparison of DC vs AC Distribution Systems, 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. 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.

MODULE V Economic Aspects of Power Generation & Tariff Methods 9 Periods

Define - Load curve, Load duration and Integrated load duration curves - Load, Demand, Diversity, Capacity, Utilization and Plant Use Factors- Coincidence factor, Contribution factor and Loss factor - Relationship between the Load factor and loss factor. Classification of loads (Residential, Commercial, Agricultural and Industrial) and their characteristics. - Numerical Problems. Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. Desirable Characteristics of a Tariff Method. Tariff Methods: Flat Rate, Block-Rate, two-part, three –part and power factor tariff methods and Numerical Problems**.**

Text Books

1. V.K Mehta and Rohit Mehta, **"Principles of Power Systems",** S.Chand& Company Ltd, New Delhi, 2004.
2. PSR. Murty**, "Electrical Power Systems",**Butterworth-Heinemann Publications, 2017.

References

1. R. K. Rajput, **"A Text Book of Power System Engineering"**, Laxmi Publications (P) Limited, 2nd Edition, 2016.
2. S.N.Singh , **"Electrical Power Generation, Transmission and Distribution"** , PHI Learning Pvt. Ltd., 2nd Edition, 2008.
3. C.L.Wadhwa, **"Electrical Power Systems"**, New Age international (P) Limited, 6th Edition, 2010.
4. Dr.B.R.Gupta, **"Generation of Electrical Energy"** , S.Chand& Company Ltd, 6th Edition, 2008.
5. G.Ramamurthy, **"Handbook of Electrical power Distribution"**, Universities Press, 2013.

E - Resources

1. https://www.electrical4u.com/power-plants-types-of-power-plant/
2. http://spectrum.ieee.org/energy
3. http://nptel.ac.in/courses/108102047/

Course Outcomes

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

1. Understand the layouts of Thermal Power station, Nuclear Power Plant and Gas Power plant.
2. Demonstrate the operation of hydro electric power plants and turbines.
3. Comprehend about various types of substations and its equipment.
4. Analyze the voltage drops in DC and AC distribution systems.
5. Evaluate the cost of generation and tariff.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	ProgrammeOutcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	2	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	2	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	2	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	2	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	2	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. IV Semester		
Code: D0209	DC MACHINES AND TRANSFORMERS	L	T	P
Credits: 4		3	1	-

Prerequisites: Electrical Circuits Analysis and Synthesis, Electro Magnetic Fields.

Course Objectives:

This course introduces the basic concepts of rotating machines. It emphasis on construction and operation of DC generators, DC Motors, Single phase transformers, Auto transformer and poly phase transformers. It also deals about the methods to evaluation the performance of DC Generators, DC Motors and Single phase transformers.

MODULE I Electro Magnetic Induction & Basic Concepts in Rotating Machines **12 Periods**

Introduction to magnetic circuits – Magnetically induced EMF and force – AC operation of magnetic circuits – Hysteresis & Eddy Current Loss. Energy in magnetic systems – Field energy & Mechanical force – Single and Multiple excited systems. MMF of distributed windings – Magnetic fields in rotating machines.

MODULE II DC Generators **13 Periods**

Construction & Principle of Operation of DC Generators – E.M.F Equation- Types of D.C Generators – Armature reaction – Methods of minimizing the effects of armature reaction – Compensating winding – Commutation – Methods of improving commutation. -Voltage build up in generators –OCC-Critical field resistance and critical speed - Causes for failure to self excite and Remedial measures – Load characteristics of shunt, series and compound generators.

MODULE III DC Motors **13 Periods**

A: Principle of operation – Back E.M.F. - Torque equation – Characteristics and application of shunt, series and compound motors and Speed control.

B:Necessity of starter -3- point and 4- point starters – Constant and Variable losses - Calculation of efficiency – Condition for maximum efficiency – Electric Braking – Brake test – Swinburne's test –Hopkinson's test.

MODULE IV Single Phase Transformers **13 Periods**

Types - Constructional details - EMF equation - Operation on no load and load - Phasor diagrams – Equivalent circuit - Losses and efficiency - Regulation. All day efficiency . OC and SC tests - Sumpner's test - Separation of losses test - Parallel operation with equal and unequal voltage ratios.

MODULE V Auto Transformers & Poly-Phase Transformers **13 Periods**

Auto transformers - Comparison with two winding transformers - Poly-phase transformers – Poly-phase connections - Y/Y, Y/Δ, Δ /Y, Δ / Δ - Open -Scott connection - Three winding transformers – Tertiary windings - Determination of Z_p, Z_s and Z_t. Inrush Current - Off load and on load tap changing.

Text Books

1. J.B.Gupta, **"Theory & Performance of Electrical Machines"**, S.K. Kataria& Sons, 15th Edition, 2015.
2. I.J.Nagrath&D.P.Kothari, **"Electric Machines"** ,Tata Mc Graw Hill, 4th Edition, 2010.

References

1. P.S. Bimbra, **"Electrical Machinery"** , Khanna Publishers, New Delhi, 7th Edition, 2011.
2. A.E.Fitzgerald, C.Kingsley and S. Umans, **"Electric Machinery"**, Tata Mc Graw-Hill Companies, 7th Edition, 2013.
3. Ashfaq Husain, **"Electric Machines"**, Danapati Rai & Co, New Delhi, 2002.
4. S.K.Bhattacharya, **"Electrical Machines"**, Tata McGraw Hill, New Delhi, 4th Edition, 2014.
5. M.V. DESHPANDE, "ELECTRICAL MACHINES", PHI LEARNING PVT. LTD., 2011.

E - Resources

1. https://www.electrical4u.com/electrical-motor-types-classification-and-history-of-motor/
2. https://www.eeweb.com/electromechanical
3. http://nptel.ac.in/courses/108105017

Course Outcomes

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

1. Apply the magnetic induction principles and have the awareness on basic concepts of rotating machines.
2. Analyze the performance of DC generators.
3. Analyze the performance of DC motors and starting methods of DC motor.
4. Evaluate the performance of single phase transformer.
5. Understand the construction and operation of poly phase transformers and auto transformer.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	ProgrammeOutcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. IV Semester		
Code: D0210	CONTROL SYSTEMS (Common for EEE & ECE)	L	T	P
Credits: 3		2	1	-

Prerequisites: Laplace Transforms, Differential Equations

Course Objectives: This course introduces different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response. It also emphasis on analysis of system performance in time and frequency domain and techniques for improving the performance.

MODULE I Systems and Representations 10 Periods

Basic elements in control systems: – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function – Synchro's,AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs

MODULE II Time Response 9 Periods

Time domain specifications – Types of test input (Standard test signals)– I and II order system response – Error coefficients – Generalized error series – Steady state error – Effects of P, PI, PID modes of feedback control.

MODULE III Stability Analysis 9 Periods

A:The concept of stability- Routh's stability criterion – Nyquist stability criterion- Performance criteria

B:Root Locus Technique: The root locus concept - Construction of root loci - Effects of addingpoles and zeros to G(s) H(s) on the root loci.

MODULE IV Frequency Response 9 Periods

Introduction, Frequency domain specifications – Bode plot – Polar plot – Gain margin and Phase margin, Nyquist Plot- Determination of closed loop response from open loop response

Effect of Lag, lead and lag-lead compensation on frequency response, Design of Lag, lead and lag-lead compensator using bode plots.

MODULE V State Space Analysis of Continuous Systems 10 Periods

Concepts of state, state variables and state model, State models for linear and time invariant Systems, derivation of state models from block diagrams, diagonalization - Solving the Time invariant state equations - State Transition Matrix and it's Properties – Concepts of Controllability and observability.

Text Books

1. I.J.Nagrath and M.Gopal, "Control Systems Engineering", New Age International Publishers, 5th Edition, 2007.
2. Benjamin.C.Kuo, "Automatic Control Systems", Prentice Hall of India, 7th Edition, 1995.

References

1. A.Nagoorkani, "Control Systems", RBA Publications, 2nd Edition, 2006.
2. M.Gopal, "Control System: Principles and Design", Tata McGraw Hill, 2 nd Edition, 2002.
3. Joseph J Distefano, "Schaum's Outline Series of Feedback and Control Systems", Tata McGraw Hill, 2nd Edition, 2014.
4. K. Ogata, "Modern Control Engineering", Pearson Education, New Delhi, 5th Edition, 2010.
5. M. Gopal, "Control Systems, Principles & Design", Tata McGraw Hill, 4th Edition,2012.

E - Resources

1. https://www.electrical4u.com/control-engineering-historical-review-and-types-of-control-

engineering/

2. http://ieeecss.org/CSM/library/2011.html

3. http://nptel.ac.in/courses/108101037/

Course Outcomes

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

1. Apply transfer function models to analyze physical systems.
2. Determine the transient and steady state behavior of systems subjected to standard test signals.
3. Analyze the linear systems for absolute and relative stability in time and frequency domain.
4. Analyze the stability of the linear system in frequency domain and design compensators.
5. Familiarize with state space analysis and system properties like Controllability and Observability.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	ProgrammeOutcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech IV Semester		
Code: D0461	BASIC SIMULATION LAB	L	T	P
Credits: 1		-	-	2

Course Objectives:

To get knowledge on how to write programs for various operations on signals and LTI systems.

List of Experiments

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit impulses, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operation of Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal Sequence and Real and Imaginary parts of Signal.
5. Convolution between Signals and Sequences.
6. Auto Correlation and Cross Correlation between signals and Sequences.
7. Verification of linearity and Time Invariance Properties of a given Continuous/ Discrete System.
8. Computation of unit Sample, Unit Step and sinusoidal responses of the given LTI System and Verifying its Physical reliability and stability Properties.
9. Gibbs Phenomenon.
10. Finding the Fourier Transform of a given Signal and Plotting its magnitude and Phase Spectrum.
11. Waveform Synthesis using Laplace Transform.
12. Sampling Theorem Verification.

Course Outcomes:

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

1. Generate Different Signals with different Parameters
2. Perform Different Operation on Matrices
3. Implement Different algorithms for small operations on a signal
4. Apply FT & LT on Signals
5. Verify the Different theorems on Signals

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	ProgrammeOutcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	-	-	-	2	-	-	2	-	-	-
CO2	3	3	3	3	2	-	-	-	2	-	-	2	-	-	-
CO3	3	3	3	3	2	-	-	-	2	-	-	2	-	-	-
CO4	3	3	3	3	2	-	-	-	2	-	-	2	-	-	-
CO5	3	3	3	3	2	-	-	-	2	-	-	2	-	-	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. IV Semester		
Code: D0211	DC MACHINES AND TRANSFORMERS LAB	L	T	P
Credits: 1		-	-	2

Course Objectives:

To provide students with a strong back ground in different types of electrical machines. To train the students with well practical knowledge of different DC machines.

List of Experiments:

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Load test on DC shunt generator.
3. Load test on DC series generator.
4. Load test on DC compound generator.
5. Hopkinson's test on DC shunts machines.
6. Fields test on DC series machines.
7. Swinburne's test and speed control of DC shunt motor.
8. Brake test on DC compound motor.
9. Brake test on DC shunt motor.
10. Retardation test on DC shunt motor.
11. Separations of losses in DC shunt motor.
12. Brake test on DC series motor.

Course Outcomes

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

1. Assess the performance of DC shunt, series and compound motors.
2. Determine the efficiency of DC shunt, series and compound motors.
3. Perform the speed control methods of DC shunt motor.
4. Predetermine the efficiency of DC shunt motor.
5. Determine the performance characteristics of DC machines.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	ProgrammeOutcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-
CO2	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-
CO3	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-
CO4	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-
CO5	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-

2024-25 Onwards (MR-24)	MALLAREDDYENGINEERINGCOLLEGE	B.Tech. IVSemester		
Code: D0555	Object Oriented Programming Lab (Common for CE, EEE,ME,ECE,MiE)	L	T	P
Credits:1		-	-	2

Prerequisites: NIL

Course Objectives:

This course will make students able to learn and understand the concepts and features of object oriented programming and the object oriented concept like inheritance and will know how to make use of interfaces and package, to acquire the knowledge in Java's exception handling mechanism, multithreading.

Software Requirements: JDK

List of Programs:

1. Write a JAVA program to display default value of all primitive data type of JAVA.

2. Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.

3. Write a Java Program to implement
   a) Default Constructor
   b) Parameterized constructor

4. Write a Java Program to implement
   a) Method overloading
   b) Method overriding

5. Write a Java program to implement
   a) Single Inheritance
   b) Multilevel Inheritance
   c) Hierarchical Inheritance

6. Write Java programs that uses the following keywords…
   a) this
   b) super

7. Write Java programs that uses the following keywords…
   a) static
   b) final

8. Write a Java program to implement
   a) abstract method
   b) Interfaces

9. Write a Java program to create user defined packages.

10. Write a Java program to implement Exception Handling using

a) try-catch clause
b) Multiple Catch clauses

11. Write a Java program that
    a) create user defined Thread by extending Thread class.
    b) create user defined Thread by implementing Runnable Interface

12. Write a Java program
    a) checks whether a given string is a palindrome or not.
    b) for sorting a given list of names in ascending order.

TEXT BOOKS:

1. Herbert Schildt, "**Java The complete reference**", TMH, 8th edition, 2011.
2. T. Budd, "**Understanding OOP with Java**", Pearson Education, updated edition, 1998.

REFERENCES:

1. P.J. Deitel and H.M. Deitel, "**Java for Programmers**", Pearson education.
2. P. Radha Krishna, "**Object Oriented Programming through Java**", Universities Press.
3. Bruce Eckel," **Programming in Java**", Pearson Education.
4. S. Malhotra and S. Choudhary," **Programming in Java**", Oxford Univ. Press.

Course Outcomes:

Course Outcomes:

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

1. Differentiate structured programming and object oriented programming and know the concepts of classes, objects, members of a class.
2. Apply object oriented programming features and concepts for solving given problems using inheritance and will know how to organize files in packages and concept of interface.
3. Capable of handling run time errors using Exceptional Handling and exploring strings.
4. Develop applications for concurrent processing using Thread Concept.
5. Capable of handling IO operations using Files.

CO-PO MAPPING

CO- PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	3	-	-	-	-	-	-	-	-	-	3	2	-
CO2	-	-	3	-	2	-	-	-	-	-	-	-	2	3	-
CO3	-	2	2	-	2	-	-	-	-	-	-	-	-	2	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. IV Semester		
Code: D00M1	GENDER SENSITIZATION (An Activity-based Course) (Common for CE, EEE, ME, ECE, MiE, CSE, CSE(DS), CSE(AI and ML), CSE(Cyber Security), CSE(IOT) and IT)	L	T	P
Credits: NIL		-	-	2

Prerequisites: NIL

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 about sex, 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:

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

Learning Outcomes

- Students will have developed a better understanding of important issues related to
- gender in contemporary India.
- 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.
- Students will attain a finer grasp of how gender discrimination works in our society
- and how to counter it.
- Students will acquire insight into the gendered division of labor and its relation to
- politics and economics.

MODULE IUNDERSTANDING GENDER **Periods**

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring

Attitudestowards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male. First lessons in Caste.

MODULE IIGENDER ROLES AND RELATIONS 6 Periods

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

MODULE IIIGENDER AND LABOUR 7 Periods

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Sharethe 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.

MODULE IVGENDER - BASED VIOLENCE 7 Periods

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a HumanRights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing-Coping withEveryday Harassment- Further Reading: "*Chupulu".*

Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. RebuildingLives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

MODULE V: GENDER AND CULTURE 7 Periods

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and PopularLiterature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender andPopular 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 onGender" 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%

TEXT BOOKS:

1. Towards a World ofEquals: A bilingual Textbookon Gender, ASuneetha –etall

REFERENCES:

1. Sen, Amartya. "More than One Million Women are Missing.' New York Review of Books 37.20 (20 December 1990). Print. We Were Making History...' Life Stories of Women in the

ToIrmgana People's Struggle. New Delhi: Kali for Women, 1989.
2. TriptiLahiri. "By the Numbers: Where Indian Women Work." Women's Studios Journal (14 November 2012) Available online at: http:// blogs.visj.com/ India real time/2012/11/14/by -the-numbers-where-Indan-womenworkP
3. K. Satyanarayana and Susie Thant (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada htto://harooreollins.co.in/BookDetailasp?FlookCndet,3732
4. Vimata. "Vantillu (The Kitchen)". Women Writing in India: 600 BC to the Present. Volume II: The 20th Century. Ed. Susie Thaw and K. Lalita. Delhi: Oxford University Press 1995. 599-601.
5. Shatrughna, Veena et al. Women's Work and its Impact on Child Health end Nutrition, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research. 1993.
6. Stree Shakti Sanghatana. 'We Were Making I listory ....' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989.

E-RESOURCES:

1. http://www.actforyouth.net/resources/rf/rf_gender1_1213.cfm (UNDERSTANDING GENDER)
2. https://www.simplypsychology.org/gender-biology.html(GENDERAND BIOLOGY)
3. http://www.yourarticlelibrary.com/essay/essay-on-gender-issues-in-labour-market-in-india/40442/ (GENDER AND LABOUR)
4. http://journals.sagepub.com/doi/abs/10.1177/1077801200006007004 (ISSUES OF VIOLENCE)
5. http://www.nordiclabourjournal.org/emner/likestilling (GENDER AND BIOLOGY)

Course Outcomes:

At the end ofthe course,

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- 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.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	-	3	3	-	2	3	1	-	-
CO2	-	-	-	-	-	3	-	3	3	-	2	3	2	-	-
CO3	-	-	-	-	-	3	-	3	3	-	2	3	1	-	-
CO4	-	-	-	-	-	3	-	3	3	-	2	3	1	-	-
CO5	-	-	-	-	-	3	-	3	3	-	2	3	2	-	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. IV Semester		
Code: D00P1	REAL-TIME RESEARCH PROJECT/ FIELD BASED PROJECT	L	T	P
Credits: 1		-	-	1

SEMESTER – V

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. V Semester		
Code: D0212	POWER TRANSMISSION SYSTEMS	L	T	P
Credits:3		2	1	-

Prerequisites: Electro Magnetic Fields, Electrical Circuit Analysis and Synthesis

Course Objectives:

This course deals with basic theory of transmission lines modeling and their performance analysis. Also this course gives emphasis on mechanical design of transmission lines, cables and insulators.

MODULE I TRANSMISSION LINE PARAMETERS 10 Periods

Structure of Power System - Parameters of single and three phase transmission lines with single and double circuits -Resistance, inductance and capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition - application of self and mutual GMD; skin and proximity effects -Typical configurations, conductor types and electrical parameters of EHV lines.

MODULE II PERFORMANCE OF TRANSMISSION LINES 10 Periods

Classification of Transmission Lines - Short, Medium and Long Lines and their Exact Equivalent Circuits- Nominal-T, Nominal-π Methods. Long Transmission Line-Rigorous Solution, Regulation and Efficiency. Evaluation of A,B,C,D Constants– Surge Impedance and Surge Impedance Loading - Ferranti Effect -Numerical Problems.

MODULE III MECHANICAL DESIGN OF TRANSMISSION LINES & OVERHEAD LINE INSULATORS 12 Periods

A: Insulators: Types of Insulators, String Efficiency and Methods for Improvement, Capacitance Grading and Static Shielding. Corona: Corona Phenomenon, Factors Affecting Corona, Critical Voltages and Power Loss, Radio Interference.

B: Sag and Tension Calculations: Sag and Tension Calculations with Equal and Unequal Heights of Towers, Effect of Wind and Ice on Weight of Conductor, Stringing Chart and Sag Template and their Applications, Numerical Problems.

MODULE IV POWER SYSTEM TRANSIENTS & TRAVELLING WAVES 12 Periods

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

MODULE V UNDERGROUND CABLES 10 Periods

Types of Cables, Construction, Types of Insulating Materials, Calculations of Insulation Resistance and Stress in Insulation, Numerical Problems. Capacitance of Single and 3-Core Belted Cables, Numerical Problems. Grading of Cables - Capacitance Grading, Numerical Problems, Description of Inter-Sheath Grading.

Text Books

1. C.L.Wadhwa, **"Electrical Power Systems"**, New Age International (P) Limited, Publishers,4th Edition, 2005.
2. John J Grainger and William D Stevenson, **"Power System Analysis"**, Tata McGraw Hill Edn., 4th Edition, 1994
3. D.P.Kothari, I.J. Nagarath, 'Power System Engineering', Mc Graw-Hill Publishing Company limited, New Delhi, Second Edition, 2008.

Reference Books

1. B.R.Gupta, 'Power System Analysis and Design' S. Chand, New Delhi, Fifth Edition, 2008.
2. Luces M.Fualken berry, Walter Coffer, 'Electrical Power Distribution and Transmission', Pearson Education, 2007.
3. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2011.
4. Arun Ingole, "power transmission and distribution" Pearson Education, 2017
5. J.Brian, Hardy and Colin R.Bayliss 'Transmission and Distribution in Electrical Engineering', Newnes; Fourth Edition, 2012.

E- Resources

1. https://www.electrical4u.com/types-of-electrical-insulator-overhead-insulator/
2. http://nptel.ac.in/courses/Webcourse-contents/IIT-KANPUR/power-system/chapter_2
3. http://nptel.ac.in/courses/108102047/

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

1 Evaluate the parameters of transmission line for various configurations.
2 Model the transmission line and analyze their performance
3 Estimate the number of insulators based on string efficiency and analyse the effects of wind and ice loading on transmission conductor
4 Determine reflection and refraction coefficients of the lines with various terminations
5 Illustrate different types of cables and describe grading of cables.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. V Semester		
Code: D0213	AC MACHINES	L	T	P
Credits:4		3	1	-

Prerequisites: Electromagnetic Fields Electrical Circuit Analysis and Synthesis

Course Objectives:

This course facilitates to study the performance of induction motors which is main drive for industrial applications. It also emphasis about the performance analysis of synchronous machines.

MODULE I Three Phase Induction Motors 13 Periods

Three phase induction motors - Constructional details - Production of rotating magnetic field - Principle of operation - Rotor EMF and rotor frequency - Rotor reactance, rotor current and power factor - Equivalent circuit - Phasor diagram - Crawling and cogging - Power stages

MODULE II Performance of Induction Motors 13 Periods

Rotor power input, Rotor copper loss and mechanical power developed and their inter relation - Torque equation - Expressions for maximum torque and starting torque – Torque- slip characteristics - Condition for maximum torque – Relation between torque and slip – Losses and efficiency – No load and blocked rotor tests – Equivalent circuit – Circle diagram – Induction generator (Elementary treatment only).

MODULE III Single Phase Induction Motors 12 Periods

A: Single phase induction motors – Principle of operation - Double revolving field theory - Split phase induction motor - Capacitor start induction motor - Capacitor start and run induction motor.

B: Equivalent circuit - Shaded pole induction motor.

MODULE IV Synchronous Generators 13 Periods

Synchronous generator – Construction, working principle - EMF equation – Armature reaction – Regulation methods – EMF, MMF,ZPF and ASA methods – Synchronizing to infinite bus bars – Two reaction theory – Parallel operation of synchronous generators.

MODULE V Synchronous Motors 13 Periods

Synchronous motor – Constructional features, principle of operation– Methods of starting – Power developed by a synchronous motor – Synchronous motor with different excitations – Effect of increased load with constant excitation, effect of changing excitation at constant load – Torque equation – V curve and inverted V curves – Hunting.

Text Books

1. P.S. Bimbra, **"Electrical Machinery"**, Khanna Publishers, New Delhi, 7th Edition, 2011.
2. J.B.Gupta, **"Theory & Performance of Electrical Machines"**, S.K. Kataria& Sons, 15th Edition, 2015

References

1. M.G Say, **"Performance and Design of A.C Machines"**, 3rd Edition, BPB Publishers, 2002
2. A.E.Fitzgerald, C.Kingsley and S.Umans, **"Electric Machinery"**, Tata McGraw-Hill Companies, 7th Edition, 2013.
3. I.J.Nagrath&D.P.Kothari, **"Electric Machines"**, Tata McGraw Hill, 4th Edition, 2010.
4. S. Kamakashaiah, **"Electromechanics-II (Transformers and Induction Motors)"**, Hitech Publishers
5. R.K.Rajput, **"Electrical Machines"**, Laxmi Publications Pvt., Ltd., New Delhi, 4th Edition,

2006.

E- Resources

1. R.K.Rajput, **"Electrical Machines"**, Laxmi Publications Pvt., Ltd., New Delhi, 4th Edition, 2006.
2. https://www.electrical4u.com/synchronous-motor-working-principle/
3. https://www.eeweb.com/electromechanical
4. http://nptel.ac.in/courses/108106072/

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

1 Impart knowledge on Poly Phase Induction Motors.
2 Analyze the performance of Induction Motors.
3 Understand the construction and operation of single phase Induction Motors
4 Analyze the performance of Synchronous Generator.
5 Analyze the performance of Synchronous Motor.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. V Semester		
Code: D0214	POWER ELECTRONICS	L	T	P
Credits:3		3	-	-

Prerequisites: Electrical Circuit Analysis and Synthesis, Analog Electronics.

Course Objectives:

This course deals about the structure, operation and characteristics of power semiconductor devices. It also emphasis on the operation, characteristics and performance parameters of single phase controlled converters, three phase controlled converters, AC voltage controllers, choppers and Inverters.

MODULE I Power Semiconductor Devices 10 Periods

Thyristors – Silicon Controlled Rectifiers (SCRs) – BJT – Power MOSFET – Power IGBT and their characteristics. Basic theory of operation of SCR – Static and Dynamic characteristics of SCR -Two transistor analogy - UJT firing circuit – Series and Parallel connections of SCRs - Snubber circuit– Specifications and Ratings of SCR, BJT, MOSFET, IGBT - Numerical problems. Natural and forced commutation (Principle only).

MODULE II Single Phase Controlled Converters 9 Periods

Single Phase Half Controlled Converters: Half controlled converters with R, RL and RLE loads without and with freewheeling Diode – Derivation of average load voltage and current -– Numerical problems.

Single Phase Fully Controlled Converters: Midpoint and Bridge configurations with R, RL and RLE loads - Derivation of average load voltage and current - Performance parameters of single-phase full bridge converter, Effect of source inductance – Derivation of load voltage and current - Numerical problems

MODULE III Three Phase Controlled Converters 9 Periods

A: Three phase three pulse converters – Mid Point and Bridge configurations – Average load voltage with R and RL loads – Numerical Problems.

B: Three phase six pulse converters – Mid Point and Bridge configurations – Average load voltage with R and RL loads – Effect of source Inductance – Numerical Problems.

MODULE IV Choppers & AC Voltage Controllers 10 Periods

Choppers: Principle of Step-down and step-up chopper-control strategies–Forced commutated chopper–Voltage commutated, Current commutated, Load commutated choppers. Switched mode regulators- Buck, boost, buck- boost converter.

AC Voltage Controllers : Single phase AC voltage controllers with R and RL loads-wave forms – Modes of operation of Triac – Triac with R and RL loads – Derivation of RMS load voltage, current and power factor – Numerical problems.

MODULE V Inverters &Cyclo-Converters 10 Periods

Inverters: Single phase inverter – Half and full bridge inverter – Wave forms - Performance parameters of inverters – Voltage control techniques for inverters. Pulse width modulation techniques - Single, multiple and sinusoidal PWM - Numerical Problems.

Three Phase Inverters: Analysis of 180 degree and 120 degree modes of operation with R and RL loads - Numerical Problems.

Cyclo Converters: Cyclo-Converters – Single phase Mid-point cyclo-converters with R and RL loads (Principle of operation only) - Bridge configuration of single phase cyclo-converter (Principle of operation) – Wave forms.

Text Books

1. M.H. Rashid, **"Power Electronics: Circuits, Devices and Applications"**, 3rd Edition, Pearson Education, New Delhi, 2014.

2. P.S. Bimbra, **"Power Electronics"**, 5th Edition, Khanna Publishers, New Delhi, 2012.

References

1 A.Chakrabarti, **"Fundamentals of Power Electronics and Drives"**, Dhanpat Rai & Co, 2008.

2 S R Doradla, A Joshi, RMK Sinha and G K Dubey, **"Thyristorised Power Controllers"**, New Age International (P) Ltd., 2012.

3 Ned Mohan, Tore M. Undeland and William P. Robbins, **"Power Electronics: Converters, Applications and Design"**, John Wiley and Sons, 2nd Edition, 2007.

4 M.D. Singh, K.B.Khanchandani, **"Power Electronics"**, 2nd Edition, Tata McGraw Hill, New Delhi, 2008.

5 L. Umanand, **"Power Electronics Essentials and Applications"**, Wiley, 2010

E- Resources

1. http://nptel.ac.in/courses/108105066/
2. https://www.elprocus.com/power-electronics-project-ideas/
3. https://www.eeweb.com/analog-design
4. http://nptel.ac.in/courses/108101038/

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

1 Describe the structure, operation and characteristics of power semi conductor devices.

2 Understand the operation, characteristics and performance parameters of single phase controlled converters.

3 Understand the operation, characteristics and performance parameters of single phase controlled converters.

4 Analyze single phase AC voltage controllers and Cyclo Converters and their applications.

5 Understand the operation, characteristics and performance parameters of choppers and inverters.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VI Semester		
Code: D0215	ELECTRICAL MEASUREMENTS AND INSTRUMENTATION	L	T	P
Credits:3		3	-	-

Prerequisites: Applied Physics, Electrical Circuits Analysis and Synthesis

Course Objectives:

This course deals about the different types of instruments to measure electrical quantities, various kinds of bridges for measurement of electrical parameters, measurement of high voltage and current by instrument transformers. It also emphasis on electronic measurements and measurement of physical quantities by transducers.

MODULE I Measuring Instruments 10 Periods

Classification of measuring Instruments -Methods of measurements, Block Diagram - Measurement system, Types of Errors, Deflecting, Control and Damping Torques PMMC, Moving iron type instruments - Expression for the deflecting torque and control torque-Extension of range using shunts and series resistance, dynamometer type instruments, Electrostatic Voltmeters.

Measurement of Power and Energy:

Electro – Dynamic wattmeter, Wattmeter methods, Three ammeter and three voltmeter methods - for low frequency power measurement, Single phase energy meter, Errors and compensation testing by phantom loading using R.S.S. meter - Power factor meters.

MODULE II Measurement of Resistance, Inductance and Capacitance 10 Periods

Measurement of low, medium and high resistances – Wheatstone's bridge, Carey Foster's bridge, Kelvin's double bridge, insulation resistance measurement, loss of charge method, Megger, Wagner's Earthing device.

AC bridges:

Inductance measurement : Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge
Capacitance measurement : De-Sauty's bridge, Schering Bridge (LV & HV bridges), Wein's bridge.

MODULE III Instrument Transformers 10 Periods

Current and Potential transformers, ratio and phase angle errors, testing and measurement of power using instrument transformers.

B:Potentiometers: Applications and DC potentiometers Principle and operation of D.C. Crompton's potentiometer – standardization –AC polar and coordinate types standardization – Measurement of unknown resistance, current, Calibration of Voltmeters and Ammeters using potentiometers.

MODULE IV Electronic Measurements 9 Periods

A: CRO: Block diagram, Sweep generation, vertical amplifiers, Lissajous pattern, measurement of frequency, phase, Amplitude.

B: Digital Multi-meter: Block diagram, principle of operation, Accuracy of measurement, Electronic Voltmeter: principle of operation, various types of electronic voltmeter, Digital Frequency meter.

MODULE V Instrumentation 9 Periods

Transducers, classification & selection of transducers, Calibration, Calibration procedures. Resistance transducer - Strain gauges, inductive transducers - LVDT & Capacitive transducers, piezoelectric and Hall-effect transducers, thermistors, thermocouples, photo-diodes & photo-transistors, encoder type digital transducers. Signal conditioning and telemetry. Basic concepts of

smart sensors and application. Data Acquisition Systems – Introduction and block diagram.

Text Books

1. A.K. Sawhney, "A Course in Electrical and Electronic Measurements and Instrumentation", Dhanpat Rai & Sons Publications, New Delhi, 2012.
2. E. W. Golding & F. C. Widdis, "Electrical Measurement & Measuring Instrument", 5th Edition, A.H.Wheeler& Co., India, 2011.

References

1 Jones, B.E, "Instrumentation Measurement and Feedback", Tata McGraw Hill, 1986.

2 Helfrick Albert D, Cooper William. D, "Modern Electronic Instrumentation and Measurement Techniques", Prentice-Hall of India, Reprint 1992.

3 J. B. Gupta, "A Course in Electronic and Electrical Measurements", S. K. Kataria & Sons, Delhi, 2003.

4 Doebelin E.O. and Manik D.N., "Measurement Systems – Applications and Design", Tata McGraw Hill Education Pvt. Ltd., Special Indian Edition, 2007.

5 D.V.S. Moorthy, "Transducers and Instrumentation", Prentice Hall of India Pvt. Ltd., 2007.

E- Resources

1. https://www.electrical4u.com/electrical-measuring-instruments-types-accuracy-precision-resolution-speed/
2. https://www.eeweb.com/test-and-measure
3. https://www.youtube.com/watch?v=moSUpIRCKMk

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

1 Understand the methods of measurement and its types.

2 Determine the circuit parameters (R, L and C) using bridges.

3 Understand the principle of operation of current and potential transformers

4 Comprehend the construction, operation and application of voltmeter, wattmeter & energy meter and understand the measurement of parameters using CRO.

5 Explain the function and working of various transducers for measuring physical quantities.

CO-PO Mapping

CO-PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	1

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. V Semester		
Code: D0224	HIGH VOLTAGE ENGINEERING (Professional Elective– I)	L	T	P
Credits:3		2	1	-

Prerequisites: Engineering Chemistry, Power Transmission Systems.

Course Objectives:

This course deals with the detailed analysis of Breakdown occur in gaseous, liquids and solid dielectrics. It also emphasis on generation and measurement of high voltage and current, high voltage testing methods.

MODULE I Introduction to High Voltage Technology and Applications 9 Periods

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, cables, power capacitors and bushings.

MODULE II Break Down in Gaseous, Liquid and Solid Dielectrics 10 Periods

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

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

MODULE III Generation and Measurement of High Voltages and Currents 10 Periods

A: Generation of high DC Voltages, generation of high AC Voltages, generation of Impulse Voltages, generation of Impulse Currents, tripping and control of Impulse Generators.

B: Measurement of high DC, AC and Impulse Voltages, measurement of high currents - direct, alternating and impulse, Oscilloscope for impulse voltage and current measurements.

MODULE IV Over Voltage Phenomenon and Insulation Co-Ordination 9 Periods

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.

MODULE V Non-Destructive Testing of Material, Electrical Apparatus & High Voltage Testing 10 Periods

Measurement of D.C resistivity, measurement of dielectric constant and loss factor. Partial discharge measurements. Testing of Insulators, Bushings, Isolators, Circuit Breakers, Cables, Transformers and Surge Arresters. Radio Interference Measurements.

Text Books

1. M. S. Naidu and V. Kamaraju, **"High Voltage Engineering",** TMH Publications, 4th Edition, 2009.
2. E.Kuffel, W.S.Zaengl, J.Kuffel, **"High Voltage Engineering: Fundamentals"**, Cbs Publishers New Delhi, 2nd Edition, 2005.

References

1. C.L. Wadhwa, **"High Voltage Engineering",** New Age Internationals (P) Limited, 3rd Edition, 2010.
2. Ravindra Arora & Wolfgang Mosch ,**"High Voltage Insulation Engineering"**, New Age International (P) Limited, 1st Edition, 1995.
3. Subir Ray, **"An Introduction to High Voltage Engineering"**, PHI Learning Private Limited, New Delhi, 2nd Edition, 2013.

4 L.L. Alston, **"High Voltage Technology"**, Oxford University Press, First Indian Edition, 2011.
5 T.J.Gallagher and A.J Pearmain, **"High Voltage Measurement, Testing and Design"**, Wiley, New York, 2nd Edition, 2007.

E- Resources

1. http://www.mv.helsinki.fi/tpaulin/Text/hveng.pdf
2. www.electricity-today.com
3. http://nptel.ac.in/courses/108104048/

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

1 Appraise the applications of solid, liquid and gaseous dielectrics in electrical engineering.
2 Appraise in gaseous insulators media & Breakdown in Composite dielectrics and solid dielectrics.
3 To paraphrase the types of generation of high A.C., D.C. and Impulse voltage existing in research centers all over the world.
4 Appraise the causes for over voltage in EH and principles of insulation co-ordination in HV and EHV in power systems
5 Demonstrate the existing testing techniques to test all the electrical equipments before commissioning into service.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. V Semester		
Code: D0225	GRAPHICAL PROGRAMME AND APPLICATIONS (Professional Elective– I)	L	T	P
Credits:3		2	1	-

Prerequisites: Nil

Course Objectives:

This course deals with the new concepts in measurement and automation. It also emphasis on controlling of external measuring device by interfacing computer, data acquisition and instrument Control.

MODULE I Virtual Instrumentation 9 Periods

Historical perspective, advantages, block diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, comparison with conventional programming. Development of Virtual Instrument using GUI, Active X Programming.

MODULE II Structures and Sequence 9 Periods

Controlling program execution with structures: While and For loops, Shift registers, Case and Sequence structure and Sub VI**.**

MODULE III Composite Data and Displays 10 Periods

Arrays and Structures: Two dimension array, Auto Indexing to set the for loop count, Building arrays with auto indexing, Array Acrobats, Polymorphism, Cluster Order, Cluster topass data, Bundling and unbundling cluster, Interchangeable arrays and cluster , Error Cluster and Error handling functions.

B: Chart update modes, Single Plot chart, Wiring multiple plot chart, Single Plot verus Multiple plot data types, The X scroll bar, clearing the chart, Stacked and overlaid plots, Multiple Yscales and chart history lengths.: Activity: Temperature monitor, Graphing a sine wave, XY plot to plot a circle, Temperature analysis and 3D graphs

MODULE IV Strings, File output and Signal Measurements and Generation 10 Periods

Single line strings, online string updation, Scroll bar, Writing and reading a measurement file, Writing and reading from a spread sheet, Computer to real world interface using LabVIEW, Creating Ni DAQ Task in Measurement and Automation Explorer (MAX), Generating code from MAX, DAQ timing and trigger, Multichannel and continuous acquisition, Streaming Data file and Counting frequency and events.VI Chassis requirements. Common Instrument Interfaces: Current loop, RS 232C/ RS485,GPIB.

MODULE V Applications 10 Periods

Networking basics for office & Industrial applications, VISA and IVI, VI toolsets, Distributed I/O modules, Development of Control system, Industrial Communication, Image acquisition and processing.

Text Books

1. Gary Johnson, **"LabVIEW Graphical Programming"**, 2nd edition, McGraw Hill, Newyork, 1997.
2. Lisa K. wells & Jeffrey Travis, **"LabVIEW for Everyone"**, Prentice Hall, New Jersey, 1997

References

1 Kevin James, **"PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control"**, Newnes, 2000.

E- Resources

1. https://www.ni.com/getting-started/labview-basics/
2. https://www.allaboutcircuits.com/technical-articles/graphical-programming-languages-labview/
3. http://home.hit.no/~hansha/video/labview_basics.php

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

1 Develop a Virtual Instrument using LabVIEW to communicate with real world.
2 Simulate real time systems using arrays and structures in LabVIEW.
3 Identify salient traits of a virtual instrument and incorporate these traits in their projects.
4 Experiment, analyze and document in the laboratory prototype measurement.
5 Develop program for application like networking, Digital image processing ,controlsystem, etc

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. V Semester		
Code: D0226	ADVANCED CONTROL SYSTEMS (Professional Elective– I)	L	T	P
Credits:3		2	1	-

Prerequisites: Control Systems

Course Objectives:

To cater the knowledge of basic and modern control system for the real time analysis and design of control systems. To expose the students to the concepts of state variables analysis. To provide adequate knowledge of nonlinear systems. To provide comprehensive knowledge of optimal control and model control.

MODULE I State Space Analysis, Controllability and Observability 10 Periods

State Space Representation, Solution of State Equation, State Transition Matrix, Canonical Forms – Controllable Canonical Form, Observable Canonical Form, Jordan Canonical Form. Tests for controllability and observability for continuous time systems – Time varying case, time invariant case, Principle of Duality, Controllability and observability form, Jordan canonical form and other canonical

MODULE II Describing Function Analysis & Phase-Plane Analysis 10 Periods

Introduction to nonlinear systems, types of nonlinearities, describing functions, describing function analysis of nonlinear control systems. Introduction to phase-plane analysis, Method of isoclines for constructing trajectories, singular points, phase-plane analysis of nonlinear control systems.

MODULE III Stability Analysis 9 Periods

Stability in the sense of Lyapunov, Lyapunov's stability and Lyapunov's instability theorems.

B: Direct method of Lyapunov for the Linear and Nonlinear continuous time autonomous systems.

MODULE IV Modal Control & Calculus of Variations 10 Periods

Effect of state feedback on controllability and observability, Design of state feedback control through pole placement. Full order observer and reduced order observer. Minimization of functionals of single function, constrained minimization. Minimum principle. Control variable inequality constraints. Control and state variable inequality constraints. Euler Lagrange equation.

MODULE V Optimal Control 9 Periods

Formulation of optimal control problem. Minimum time, minimum energy, minimum fuel problems. State regulator problem. Output regulator problem. Tracking problem, continuous-time linear regulators.

Text Books

1. M. Gopal, **"Modern Control System Theory"**, New Age International Publishers, 2nd Edition, 1996.
2. I.J.Nagarath and M.Gopal, **"Control Systems Engineering"**, New Age International Publishers, 5th Edition, 2007.

References

1

E- Resources

1. K. Ogata, **"Modern Control Engineering"**, Prentice Hall of India, 3rd Edition, 1998.
2. M.Gopal, **"Digital Control and State Variable Methods"**, Tata McGraw-Hill Companies, 1997.
3. Stainslaw H. Zak, **"Systems and Control"**, Oxford Press, 2003.
4. Stanley M. Shiners, **"Modern Control System Theory and Design"**, John Wiley and Sons Publications, 2nd Edition, 1998.
5. Khalil H.D., **"Nonlinear Systems"**, Prentice Hall Publications, 3rd Edition, 2003.

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

1 Analyze the system controllability and observability using state space representation.
2 Analyze the non linear systems using describing function method and phase plane analysis.
3 Analyze the concept of stability of nonlinear systems using Lyapunov's theorems.
4 Design pole-assignment controller and the specific design procedures for minimization and Euler Lagrange theorem.
5 Apply the knowledge of basic and modern control system for the real-time analysis and design the solution for optimal control problems.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. V Semester		
Code: D0227	DIGITAL CONTROL SYSTEMS (Professional Elective– I)	L	T	P
Credits:3		2	1	-

Prerequisites: Control Systems

Course Objectives:

This course deals with z-transforms, the estimation of stability in different domains, the design of discrete time control systems, compensators, state feedback Controllers, state observers through various transformations.

MODULE I Discrete Representation of Continuous Systems 9 Periods

Basics of Digital Control Systems. Discrete representation of continuous systems. Sample and hold circuits. Mathematical Modeling of sample and hold circuits. Effects of Sampling and Quantization. Choice of sampling frequency. ZoH equivalent.

MODULE II Discrete System Analysis 10 Periods

Z-Transform and Inverse Z Transform for analyzing discrete time systems. Pulse Transfer function. Pulse transfer function of closed loop systems. Mapping from s-plane to z plane. Solution of Discrete time systems. Time response of discrete time systems.

Stability of Discrete Time System: Stability analysis by Jury's test. Stability analysis using bilinear transformation. Design of digital control systems with dead beat response. Practical issues with dead beat response design.

MODULE III State Space Approach for Discrete Time Systems 10 Periods

State space models of discrete systems, State space analysis. Lyapunov Stability. Controllability, reach-ability, Reconstructibility and observability analysis. Effect of pole zero cancellation on controllability& observability

MODULE IV Design of Digital Control System 10 Periods

Design of Discrete PID Controller, Design of discrete state feedback controller. Design of set point tracker. Design of Discrete Observer for LTI System. Design of Discrete compensator.

MODULE V Discrete Output Feedback Control 9 Periods

Design of discrete output feedback control. Fast output sampling (FOS) and periodic output feedback controller design for discrete time systems.

Text Books

1. K. Ogata, "Digital Control Engineering", Prentice Hall, Englewood Cliffs, 1995.
2. M. Gopal, "Digital Control Engineering", Wiley Eastern, 1988.

References

1. G. F. Franklin, J. D. Powell and M. L. Workman, "Digital Control of Dynamic Systems", Addison-Wesley, 1998.
2. B.C. Kuo, "Digital Control System", Holt, Rinehart and Winston, 1980.

E- Resources

1. https://www.coursehero.com/file/13785953/DIGITAL-CONTROL-SYSTEMSpdf/
2. http://nptel.ac.in/courses/108103008/
3. http://www.sciencedirect.com/science/book/9780123943910

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

1 Obtain discrete representation of LTI systems.
2 Analyze stability of open loop and closed loop discrete-time systems.

3 Understand state space representation of the control systems, concepts of controllability andobservability
4 Design and analyze digital controllers.
5 Design state feedback and output feedback controllers

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	2	2	-	-	-	-	-	-	3	2	-	3
CO2	3	2	1	2	2	-	-	-	-	-	-	3	2	-	3
CO3	3	2	1	2	2	-	-	-	-	-	-	3	2	-	3
CO4	3	2	2	2	2	-	-	-	-	-	-	3	2	-	3
CO5	3	2	2	2	2	-	-	-	-	-	-	3	2	-	3

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. V Semester		
Code: D0228	FUNDAMENTALS OF NANOSCIENCE (Professional Elective–I)	L	T	P
Credits:3		2	1	-

Prerequisites: Undergraduate level Physics, Chemistry

Course Objectives:
To learn about basis of nanomaterial science, preparation method, types and application

MODULE I Introduction **8 Periods**

Nano scale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering- Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thin films- multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

MODULE II General Methods of Preparation **9 Periods**

Bottom-up Synthesis-Top-down Approach: Co-Precipitation, Ultra sonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE

MODULE III Nanomaterials **12 Periods**

Nano forms of Carbon - Buckminster fullerene- graphene and carbon nanotube, Single wall carbon Nanotubes (SWCNT) and Multi wall carbon nanotubes (MWCNT)- methods of synthesis(arc-growth, laser ablation, CVD routes, Plasma CVD), structure-property Relationships applications-Nano metal oxides-ZnO, TiO2,MgO, ZrO2, NiO, Nano alumina, CaO, AgTiO2, Ferrites, Nano clays- functionalization and applications-Quantum wires, Quantum dots-preparation, properties and applications.

MODULE IV Characterization Techniques **9 Periods**

X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA, SIMS-Nano indentation

MODULE V Applications **7 Periods**

Nano InfoTech: Information storage- Nano computer, molecular switch, super chip, nanocrystal, Nanobiotechlogy: Nano probes in medical diagnostics and biotechnology, Nano medicines, Targetted drug delivery, Bio imaging - Micro Electro Mechanical Systems (MEMS), Nano Electro Mechanical Systems (NEMS)- Nano sensors, nano crystalline silver for bacterial inhibition, Nanoparticles for sunbarrier products - In Photostat, printing, solar cell, battery.

Text Books

1. A.S. Edelstein and R.C. Cammearata, eds., "Nanomaterials: Synthesis, Properties and Applications", Institute of Physics Publishing, Bristol and Philadelphia, 1996.
2. N John Dinardo, "Nanoscale Charecterisation of surfaces & Interfaces", 2nd edition, Weinheim Cambridge, Wiley-VCH, 2000.

References

1 G Timp, "Nanotechnology", AIP press/Springer, 1999.

2 AkhleshLakhtakia,"The Hand Book of Nano Technology, Nanometer Structure, Theory, Modeling and Simulations". Prentice-Hall of India (P) Ltd, New Delhi, 2007.

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

1 Understand the implications of Nano-Technology for Physics, Chemistry, Biology and Engineering
2 Understand the general methods of preparation of nanomaterial.
3 Familiarize about the science of nanomaterial
4 Compare the different characterization techniques of nanomaterial
5 Describe the different applications of nanotechnology.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	-	-	-	-	-	1	2	-	-
CO2	3	3	3	-	1	1	-	-	-	-	-	1	2	-	-
CO3	2	3	--	-	-	1	-	-	-	-	-	1	2	-	-
CO4	2	2	2	-	2	1	-	-	-	-	-	1	2	-	-
CO5	1	2	3	1	-	1	-	-	-	-	-	1	2	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. V Semester		
Code: D0216	AC MACHINES LAB	L	T	P
Credits: 1		-	-	2

Prerequisites: DC Machines Lab

Course Objectives:

This course deals with the practical aspects of various ac machines like transformer, induction motor and synchronous machines.

List of Experiments:

1. OC & SC Tests on Single Phase Transformer.
2. Sumpner's test on a pair of Single Phase Transformers.
3. Scott Connection of Transformers.
4. No-load & Blocked rotor tests on Three Phase Induction Motor.
5. Regulation of Three-Phase Alternator by Synchronous Impedance & M.M.F. Methods.
6. V and Inverted V Curves of a Three-Phase Synchronous Motor.
7. Equivalent Circuit of a Single Phase Induction Motor.
8. Determination of X_d and X_q of Salient Pole Synchronous Machine.
9. Parallel operation of Single Phase Transformers.
10. Brake test on Three Phase Induction Motor.
11. Regulation of Three-Phase Alternator by Z.P.F. and A.S.A Methods.
12. Load test on Three-Phase Alternator.

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

1 Assess the performance of single phase transformer using various methods.
2 Assess the performance of single phase induction motor.
3 Determine the regulation of alternator using different methods
4 Determine the performance of 3 phase induction motor by various methods.
5 Assess the performance of synchronous machines.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. V Semester		
Code: D0217	CONTROL SYSTEMS LAB	L	T	P
Credits: 1		-	-	2

Prerequisites: Nil

Course Objectives:

This course will give the basic knowledge on practical control system and PLC applications. It emphasizes the knowledge on applications of machines & electronic devices with control systems

List of Experiments:

1. Time Response of Second Order System.
2. Characteristics of Synchros.
3. Programmable Logic Controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC Servo Motor.
5. Transfer function of DC Motor.
6. Effect of P, PD, PI, PID Controller on a Second Order System.
7. Lag and Lead Compensation – Magnitude and Phase Plots.
8. Temperature Controller using PID (open loop & closed loop).
9. Characteristics of Magnetic Amplifiers (Series, Parallel & Separately-Excited).
10. Characteristics of AC Servo Motor.
11. Stability Analysis (Root Locus, Bode, Nyquist) of Linear Time Invariant system using MATLAB.
12. State Space Model for Classical Transfer Function using MATLAB.

Course Outcomes : At the end of the course, students will be able to	
1	Formulate transfer function for given control system problems.
2	Ability to find time response of given control system model.
3	Plot Root Locus and Bode plots for given control system model by using MATLAB.
4	Ability to design Lead, Lag, Lead-Lag systems in control systems.
5	Ability to design PID controllers for given control system model.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-
CO2	3	3	3	3	-	-	-	-	3	-	-	-	2	-	-
CO3	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-
CO4	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-
CO5	3	3	3	3	-	-	-	-	3	-	-	3	2	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. V Semester		
Code: D0563	Fundamentals of Database Management Systems Lab (Common for CE, EEE, ME, ECE, MiE.)	L	T	P
Credits: 2		-	1	2

Prerequisites: Nil

Course Objectives:

This course enables the students to practice the concepts learnt in the subject DBMS by developing a database for an example project. The student is expected to practice the querying a relational database i.e., "Mysql" with various functionalities of SQL and PL/SQL statements using a sample database.

Sample Database:

Railway Reservation System -(Redesigning IRCTC database)

Train (train Number, name, source, destination, start_time, reach_time, traveltime, distance, class, days, type)

Ticket (PNRNo, Transactionid, from_station, To_station, date_of_journey, class date_of_booking, total_ticket_fare, train number)

Passenger (PNR No, Serial no, Name, Age, Reservation_status)

Train_Route(Train_No, route_no, station_code, name, arrival_time, depart_time, distance, day)

Train_Ticket_fare(Train_No, class, base_fare, reservation_charge, superfast_charge, other_charge, tatkal_charge, service_tax)

List of experiments:

1 SQL Data Definition Language Commands: Create all the tables specified above. Make underlined columns as primary key. (use number, number(m,n), varchar(n), date, time, timestamp data types appropriately)
Insert at least 5 rows to each table. (Check www.irctc.co.in website for actual data)

2 SQL Data Manipulation Language Commands:

1. Change the name of the Passenger table to Passenger_Details.
2. List all train details.
3. List all passenger details.
4. Give a list of trains in ascending order of number.
5. List the senior citizen passengers details.
6. List the station names where code starts with 'M'.
7. List the trains details within a range of numbers.
8. Change the super fast charge value in train fare as zero, if it is null.
9. List the passenger names whose tickets are not confirmed.
10. Remove all the rows from Passenger table permanently.

3 Create (Alter table to add constraint) the necessary foreign keys by identifying the relationships in the table.

1) Add a suitable constraint to train table to always have train no in the range 10001 to 99999.
2) Add a suitable constraint for the column of station name, so that does not take duplicates.
3) Change the data type of arrival time, depart time (date -> timestamp or timestamp to date), and do the necessary process for updating the table with new values.
4) Add a suitable constraint for the class column that it should take values only as 1A, 2A,

3A, SL, C.

5) Add a not null constraint for the column distance in train_route.

4 Designing Employee Database with MySQL (Create and insert data in EMP table, DEPT table and SALGRADE table)

5 Multi row functions, GROUP By clause, HAVING clause, ORDER BY clause in SQL on sample database.

6 Use Join Query

1. Find the train names that stop in 'Katpadi'.
2. Find the train names that are superfast and the service tax is zero.
3. Find the Passenger name (and train name) who have booked for the train that starts from 'Chennai'.
4. Display the trains names, each type of class and the total fare for each type of class.
5. Display all the train details and the ticket details (if booked any).

7 Use Nested Query(in Operators)

1. Find the train names that stop in 'Warangal'.
2. Find the train names that are superfast and the service tax is zero.
3. Find the Passenger name who have booked for the train that starts from 'Secunderabad'.
4. Find the trains names that have all the AC coaches and the base fare is less than 3000 for each case.

8 Create sample Views and practice basic operation

9 Write a PL/SQL procedures to practice Conditional Statements

10 Write a PL/SQL procedures to practice Iterative Statements

11 Implementing simple trigger

12 Implementing simple cursor

Text Books

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

References

1 Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel, 7th Edition.

2 SQL The Complete Reference, James R. Groff, Paul N. Weinberg, 3rd Edition,

3 Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.

4 Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah,PHI.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	2	-	-	-	-	-	-	-	-	-	1	2	-
CO3	2	2	2	3	-	-	-	-	-	-	-	-	-	2	2

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. V Semester		
Code:D00M3	QUANTITATIVE APTITUDE AND VERBAL REASONING – I (Common for All Branches)	L	T	P
Credits:Nil		1	1	-

Module – I **8 Periods**

Quants: Percentages, Profit and Loss.

- **Percentages-** *Percentage Increase/Decrease; Results on Population; Results on Depreciation.*
- **Profit & Loss-***Cost Price; Selling Price: Profit or Gain; Gain Percentage; Loss Percentage.*

Verbal: Articles, Para Jumbles

- **Articles-** *Types of articles, Countable nouns, Uncountable nouns, Usage of articles, Omission of articles.*
- **Para Jumbles-** *Para Jumbles, Types of Para Jumbles, Strategies to answer questions on Jumbled Paragraphs.*

Logical: Data Arrangements, Blood Relation

- **Data Arrangements-** *Linear Arrangement, Circular Arrangement, Multi-Dimensional Arrangement.*
- **Blood Relations-** *Classification of blood relations, Pointing a person, Equation related problems.*

Module – II **6 Periods**

Quants: Interests

- **Interests-***Types of interest; Simple interest; principle; Rate of interest; compound interest; interest is compounded Annually; interest is compounded Half-yearly; interest is compounded Quarterly; Rates are different for different years, say R_1%, R_2%, R_3% for 1st, 2nd and 3rd year respectively; Present worth of Rs. x due n years.*

Verbal: Sentence Completion, Prepositions

- **Sentence Completion-** *Formats of Question; Strategies to solve sentence completion questions- Proactive and reactive solving, Identifying clues- Signposts, Types of signposts, Root words, Sentence structure clues.*
- **Prepositions-** *Definition, Types of prepositions, Preposition of Place, Preposition of Time, Preposition of Direction, Compound Prepositions, Prepositional Phrases.*

Logical: Coding and Decoding

- **Coding and Decoding-***Number Series, Alphabet Series, Analogy, Odd Man Out, Visual Reasoning.*

Module–III **6 Periods**

Quants: Ratio and Proportion, Averages

- **Ratios & Proportion-***The ratio of two quantities a and b in the same units; Proportion; The equality of two ratios is called proportion; Fourth Proportional; Mean Proportional; Comparison of Ratios; Duplicate Ratios; Variations.*
- **Averages-** *Average Speed, Weighted average*

Verbal: Vocabulary

- **Vocabulary-***Etymology, Root Words, Prefixes and Suffixes; Synonyms and Antonyms, Tips to solve questions on Synonyms and Antonyms; Word Analogy, Patterns of questions on Word Analogy; Miscellaneous Vocabulary.*

Logical: Data Interpretation and Data Sufficiency

- **Data Interpretation-** *Tables, Pie charts, Bar Graphs, Line graphs*
- **Data Sufficiency-***Strategies to solve.*

Module – IV **6 Periods**

Quants: Time and Work;

- **Time & Work-** *Work from Days: Calculate the one-day work; Days from Work: Shortcut to calculate the work in given time;*

.**Verbal: Sentence Correction**

- **Sentence Correction-** *Subject-Verb Agreement; Modifiers; Parallelism; Pronoun-Antecedent Agreement; Verb Time Sequence; Comparisons; Determiners; Exercise Questions.*

Logical: Clocks and Calendars

- **Clocks:***Introduction, Derivation of angles, Angles between hands of the clock, Hands together, Hands at angular distance, Gain & Loss problems.*
- **Calendars:** - *Leap year-Non leap year, Odd days, Finding the day from date, Repeated years.*

Module - V: **6 Periods**

Quants: Mixtures and Alligations;

- **Alligation**- *Mean Price; Rule of Alligation; a container contains x of liquid from which y units are taken out and replaced by water;*

Verbal: Reading Comprehension, Critical Reasoning

- **Reading Comprehension-** *Speed reading strategies; Reading Comprehension - types of questions, tackling strategies; Critical Reasoning.*

Logical: Directions, Cubes, Syllogisms

- **Directions -***Introduction, Direction based questions, Shadowbased problems.*
- **Cubes**- *Cube &cuboid concepts, 3-2-1-0 faced problems.*
- **Syllogisms**- *Statements and Conclusion, Syllogisms using Venn Diagrams.*

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VI Semester		
Code: D00M6	INTELLECTUAL PROPERTY RIGHTS	L	T	P
Credits:Nil		3	-	-

Course Objectives:

- Significance of intellectual property and its protection
- Introduce various forms of intellectual property

Course Outcomes:

- Distinguish and Explain various forms of IPRs.
- Identify criteria to fit one's own intellectual work in particular form of IPRs.
- Apply statutory provisions to protect particular forms of IPRs.
- Appraise new developments in IPR laws at national and international level

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 trademark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copyrights: Fundamental of copyright law, originality of material, rights of reproduction, rights to perform the work publicly, copyright ownership issues, copyright registration, notice of copyright, International copyright law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, and trade secret litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V

New development of intellectual property: new developments in trademark law; copyright law, patent law, intellectual property audits.

International overview on intellectual property, international – trademark law, copyright law, international patent law, and international development in trade secrets law.

TEXT BOOK:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.

REFERENCE BOOK:

1. Intellectual property right – Unleashing the knowledge economy, prabuddhaganguli, Tata McGraw Hill Publishing company ltd.

SEMESTER – VI

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VI Semester		
Code: D0218	POWER SYSTEM ANALYSIS	L	T	P
Credits:3		3	-	-

Prerequisites: DC Machines & Transformers, AC Machines, Power Transmission Systems

Course Objectives:

- To model the power system under steady state operating condition
- To understand and apply iterative techniques for power flow analysis
- To model and carry out short circuit studies on power system
  To model and analyze stability problems in power system

MODULE I POWER SYSTEM 9 Periods

Power system components – Representation - Single line diagram - per unit quantities - p.u. impedance diagram - p.u. reactance diagram - Network graph, Bus incidence matrix, Primitive parameters, Bus admittance matrix from primitive parameters - Representation of off nominal transformer - Formation of bus admittance matrix of large power network

MODULE II POWER FLOW ANALYSIS 9 Periods

Bus classification - Formulation of Power Flow problem in polar coordinates - Power flow solution using Gauss Seidel method - Handling of Voltage controlled buses - Power Flow Solution by Newton Raphson method.

MODULE III SYMMETRICAL FAULT ANALYSIS 9 Periods

Assumptions in short circuit analysis - Symmetrical short circuit analysis - Bus Impedance matrix building algorithm (without mutual coupling) – Symmetrical fault analysis through bus impedance matrix - Post fault bus voltages - Fault level – Current limiting reactors

MODULE IV UNSYMMETRICAL FAULT ANALYSIS 9 Periods

Symmetrical components - Sequence impedances - Sequence networks - Analysis of unsymmetrical faults at generator terminals: LG, LL and LLG - unsymmetrical fault occurring at any point in a power system - computation of post fault currents in symmetrical component and phasor domains.

MODULE V STABILITY ANALYSIS 9 Periods

Classification of power system stability – Rotor angle stability - Swing equation – Swing curve - Power-Angle equation - Equal area criterion - Critical clearing angle and time -Classical step-by-step solution of the swing equation.

Text Books

1. John J. Grainger, William D. Stevenson, Jr, 'Power System Analysis', Mc Graw Hill Education (India) Private Limited, New Delhi, 2015.
2. Kothari D.P. and Nagrath I.J., 'Power System Engineering', Tata McGraw-Hill Education, Second Edition, 2008.
3. Hadi Saadat, 'Power System Analysis', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.

References

1. Pai M A, 'Computer Techniques in Power System Analysis', Tata Mc Graw-HillPublishing Company Ltd., New Delhi, Second Edition, 2007.
2. J. Duncan Glover, MulukutlaS.Sarma, Thomas J. Overbye, 'Power System Analysis&Design', Cengage Learning, Fifth Edition, 2012.
3. Gupta B.R., 'Power System - Analysis and Design', S. Chand Publishing, 2001.

4 Kundur P., 'Power System Stability and Control', Tata McGraw Hill Education Pvt.Ltd., New Delhi, 10th reprint, 2010.

E- Resources

1. https://nptel.ac.in/courses/108/105/108105067/
2. https://nptel.ac.in/content/storage2/courses/108104051/chapter_9/9_1.html

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

1 Formulate the incidence, network matrices and model the power system components
2 Understand and apply iterative techniques for power flow analysis
3 Analyze a power system network under Symmetrical Conditions
4 Understand Positive Sequence, Negative & zero sequence system and fault analysis.
5 Analyze power system operation and stability control

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VII Semester		
Code:D0H09	MANAGEMENT FUNDAMENTALS (Common for EEE, ECE, CSE and IT)	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course Objectives:
Through reading the text, references and discussion of cases students should be able to understand the fundamentals underlying the management of an organization

MODULE I Management and Principles of Management 9 Periods

A. **Introduction to Management:** Concepts of Management and organization-nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management.

B. **Management Theories:** Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Corporate Social responsibility.

MODULE II Planning, Organization and types of Structures 10 Periods

A. Planning: Need for planning- -Steps in the process of planning-Advantages and limitation of planning. Types of planning - Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Management by Objectives (MBO).

B. Organization and types of Structures: Basic concepts related to Organization - Departmentation and Decentralization, Types of Organizations- Line organization, Line and staff organization, functional organization, committee organization, matrix organization, Virtual Organization, Cellular Organization, boundary less organization, inverted pyramid structure, lean and flat Organization structure.

MODULE III Staffing and controlling 10 Periods

A. Staffing: Basic concepts of HRM, functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development. Performance Appraisal, Job Evaluation and Merit Rating.

B. Controlling: process of controlling, types of controlling, managing productivity, Quality Control: chart, R chart, C chart, P chart, (simple Problems), Deming's contribution to quality.

MODULE IV Operations and Materials Management 9 Periods

A. Operations Management : Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement.

B. Materials Management: Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records.

MODULE V Project Management and Contemporary Practices 10 Periods

A. Project Management (PERT/CPM): Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems)

B. Contemporary Management Practices: Basic concepts of ERP, Just-In-Time (JIT) System, Total Quality Management (TQM), six sigma and Capability Maturity Model (CMM) Levels,

Bench marking, Balanced Score card.

Text Books

1. Aryasri, **Management Science**, 4th edition TMH, 2004.
2. Stoner, Freeman, Gilbert, **Management,** Pearson Education, New Delhi, 6th Ed, 2004.

References

4. Kotler Philip & Keller Kevin Lane, **"Marketing Management"**, PHI, 12th edition, 2005
5. Koontz &Weihrich, **"Essentials of Management"**, TMH, 6th edition, 2005.
6. Thomas N.Duening& John M. Ivancevich **"Management - Principles and Guidelines"**, Biztantra, 5th edition 2003.
7. Memoria & S.V. Gauker, **"Personnel Management"**, Himalaya, 25th edition, 2005
8. Samuel C. Certo, **"Modern Management"**, PHI, 9th edition, 2005.

E- Resources

1. http://freevideolectures.com/Course/2689/Management-Science
2. http://www.onlinevideolecture.com/?course=mba-programs&subject=human-resource-management
3. http://www.onlinevideolecture.com/?course=mba-programs&subject=marketing-fundamental
4. http://freevideolectures.com/Course/2371/Project-and-Production-Management
5. http://nptel.ac.in/courses/110105034/

Course Outcomes

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

1. Understand the various concepts, principles and theories of management.
2. Understand the basic concepts of planning and various structures of organizations.
3. Understand the process of staffing and controlling
4. Understand the process of operations management. Also learn the concepts of materials management and marketing management at an organization.
5. Understand the various contemporary management practices. Also the project management techniques.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2		3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2		3
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2		3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2		3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2		3

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VI Semester		
Code: D0410	MICROPROCESSORS AND MICROCONTROLLERS	L	T	P
Credits:3		3	-	-

Pre-Requisites: Digital Electronics.

Course Objectives::This course provides the students to understand operation and programming of 8085 Microprocessor, develops real time applications using 8086 processor, understand the basic concepts of 8051 Microcontroller and interfacing with I/O devices.

MODULEI:8085 ARCHITECTURE [8 PERIODS]

Introduction to Microprocessors, Architecture of 8085, registers & flag register, Pin Configuration and Functions, Generation of Control Signals: Bus Timings: De-multiplexing of address/ data bus. Instruction Set and Programming with 8085.

MODULEII:8086 ARCHITECTURE [10 PERIODS]

8086 Architecture: 8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Physical Memory Organization, 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.

MODULEIII: INTRODUCTION TO MICROCONTROLLERS: [10PERIODS]

A:Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.

B: 8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters.

MODULEIV: I/O AND MEMORY INTERFACE [10PERIODS]

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.

MODULEV:ARM Architecture [10 Periods]

A: 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.

B: **Advanced ARM Processors:** Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture. Introduction to Intel i3, i5 and i7 Processors.

TEXTBOOKS:

1. Ramesh Gaonkar, "Microprocessor Architecture, Programing and Application with 8085"Penram,5th Edition, 2002.
2. A. K.Ray, "Advanced Micro processors and Peripherals" 3 rdTata McGraw-Hill, Edition.
3. Mazidi, Mazidi&McKinlay, "The 8051 Microcontroller and Embedded Systems using Assembly and C" 2 ndEdition, PHI .
4. ARM System Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012.

REFERENCEBOOKS:

1. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed, 2004.
2. Microprocessors and Interfacing, D. V. Hall, TMGH, 2nd Edition 2006.
3. The 8051 Microcontrollers, Architecture and Programming and Applications -K. Uma Rao, AndhePallavi, Pearson, 2009

E-Resources:

1. https://www.tutorialspoint.com › Microprocessor › Microprocessor - 8085 Architecture
2. http://www.cpu-world.com/CPUs/8086/
3. https://www.journals.elsevier.com/microprocessors-and-microsystems/
4. http://rtcmagazine.com/technologies/view/Microcontrollers
5. http://nptel.ac.in/courses/106108100/
6. http://nptel.ac.in/courses/108107029/
7. nptel.ac.in/courses/106108100/

COURSEOUTCOMES:

Atthe end ofthecourse,studentswillbeable to:

1. Explain 8085 microprocessor features..
2. Develop programs using 8085 instruction set.
3. Identify peripheral devices to interface with 8086 microprocessor.
4. GetSummarize different 8051 family microcontrollers.
5. Design to interface input and output devices with 8051 microcontroller.

CO-PO,PSOMapping (3/2/1indicatesstrengthofcorrelation)3-Strong, 2-Medium,1-Weak															
COS	ProgrammeOutcomes(POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	1	-	-	-	-	-	-	-	-	1	3		
CO2	3	2	1	1	2	-	-	-	-	-	-	1	3	2	2
CO3	3	2	2	2	2	-	-	-	-	-	-	2	3	2	2
CO4	3	1	1	-	-	-	-	-	-	-	-		3		
CO5	3	3	3	2	2	-	-	-	-	-	-	2	3	2	3

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VI Semester		
Code: D0229	ELECTRICAL DRIVES (Professional Elective - II)	L	T	P
Credits:3		3	-	-

Prerequisites: DC Machines & Transformers, AC Machines and Power Electronics

Course Objectives:

To expose the students about the basic idea of electric drives and its characteristics by various power converter topologies. To familiar with the control of DC & AC motors with different techniques.

MODULE I Electric Drives **10 Periods**

Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

Control of DC motors by Single phase Converters:

Introduction to thyristor controlled drives, single phase semi and fully controlled converters connected to D.C separately excited and D.C series motors – continuous current operation – output voltage and current waveforms – Speed and torque expressions – Speed–Torque characteristics - Problems on converter fed D.C motors.

MODULE II Control of DC Motors by Three Phase Converters **9 Periods**

Three phase semi and fully controlled converters connected to D.C separately excited and D.C series motors – Output voltage and current wave forms – Speed and Torque expressions – Speed – Torque characteristics – Problems

MODULE III Four Quadrant Operations of DC Drives **10 Periods**

A: Introduction to Four quadrant operation – Motoring operations. Electric Braking – Plugging, dynamic and regenerative braking operations. Four quadrant operation of D.C motors by dual converters.

B: Control of DC motors by Choppers:

Single quadrant, Two quadrant and four quadrant chopper fed D.C separately excited and series excited motors – Continuous current operation – Output voltage and current wave forms – Speed torque expressions – Speed torque characteristics – Problems on chopper fed D.C Motors.

MODULE IV Control of Induction Motor through Stator Voltage and Stator Frequency **10 Periods**

Variable voltage characteristics - Control of Induction Motor by AC voltage controllers Waveforms – Speed torque characteristics.Variable frequency characteristics - Control of induction motor by voltage source inverter and current source inverter - Cyclo converters - PWM control – Introduction to CSI and VSI – Comparison of VSI and CSI operations – Speed torque characteristics – Numerical problems on induction motor drives.

MODULE V Control of Induction Motor through Rotor & Synchronous Motors **9 Periods**

Static rotor resistance control – Slip power recovery – Static Scherbius drive – Static Kramer drive – their performance and speed torque characteristics – advantages - applications – Problems. Separate control & self-control of synchronous motors – Operation of self-controlled synchronous motors by VSI.

Text Books

1. G.K. Dubey, “Fundamentals of Electric Drives”, Narosa Publications, 5th Edition, reprint, 2005.
2. B.K.Bose, “Modern Power Electronics and AC Drives”, Prentice Hall Inc., 2002.

References

1. MD Singh and K B Khanchandani, "Power Electronics", Tata McGraw Hill Publishing Company, 1998.
2. Vedam Subramanyam, "Thyristor Control of Electric Drives", Tata McGraw Hill Publilcations, Reprint 2001.
3. SK Pillai, "A First Course on Electrical Drives", New Age International (P) Ltd., Reprint 2009.
4. R. Krishnan, "Electric Motor & Drives Modeling, Analysis and Control", Prentice Hall of India, 1st Edition, 2001.
5. P.C.Sen, "Thyristor DC Drives", John Wiley & Sons, New York, 2008.

E- Resources

1. https://www.eeweb.com/electromechanical
2. https://www.electrical4u.com/electrical-drives/
3. http://nptel.ac.in/courses/108108077/

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

1. To paraphrase the characteristics of electric drives and control of D.C motors.
2. Analyze the control of D.C motor by three phase converter.
3. Describe the various braking operations of D.C motors by dual converter and choppers.
4. Express the control of induction motor by various converter topologies.
5. Analyze the control of induction motor through rotor side & control of synchronous motors by VSI.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	-	-	-	-	-	-	-	2	2	-	-
CO2	3	3	3	2	-	-	-	-	-	-	-	2	2	-	-
CO3	3	3	3	2	-	-	-	-	-	-	-	2	2	-	-
CO4	3	3	3	2	-	-	-	-	-	-	-	2	2	-	-
CO5	3	3	3	2	-	-	-	-	-	-	-	2	2	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VI Semester		
Code: D0230	ELECTRICAL MACHINE DESIGN (Professional Elective - II)	L	T	P
Credits:3		3	-	-

Prerequisites: DCMachines and Transformers and AC Machines.

Course Objectives:

To expose the students about the mmf calculations and thermal ratings of various types of electrical machines. To design the main dimension of DC machines, AC machines and transformer based on power ratings and cooling system of electrical machines.

MODULE I INTRODUCTION 10 Periods

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

MODULE II DC MACHINES 9 Periods

Output Equations – Main Dimensions – Choice of Specific Electric and Magnetic Loading – Magnetic Circuits Calculations - Carter's Coefficient - Net length of Iron –Real & Apparent flux densities – Selection of number of poles – Design of Armature – Design of commutator and brushes – performance prediction using design values.

MODULE III INDUCTION MOTORS 10 Periods

A: Output equation of Induction motor – Main dimensions – Choice of Average flux density – Length of air gap- Rules for selecting rotor slots of squirrel cage machines – Design of rotor bars & slots – Design of end rings.

B:Design of wound rotor – Magnetic leakage calculations – Leakage reactance of polyphase machines- Magnetizing current - Short circuit current – Operating characteristics- Losses and Efficiency.

MODULE IV SYNCHRONOUS MACHINES 10 Periods

Output equations – choice of Electrical and Magnetic Loading – Design of salient pole machines – Short circuit ratio – shape of pole face – Armature design – Armature parameters – Estimation of air gap length – Design of rotor –Design of damper winding – Determination of full load field mmf – Design of field winding – Design of turbo alternators – Rotor design.

MODULE V TRANSFORMERS 9 Periods

Constructional details of core and shell type transformers – output rating of single phase and three phase transformers – optimum design of transformers – design of core, yoke and windings for core and shell type transformers – equivalent circuit parameters from designed data – losses and efficiency calculations.

Text Books

1. Sawhney, A.K., 'A Course in Electrical Machine Design', Dhanpat Rai & Sons, New Delhi, 1984.
2. M.V.Deshpande "Design and Testing of Electrical Machine Design" Wheeler Publications, 2010.

References

1 A.Shanmuga Sundaram, G.Gangadharan, R.Palani 'Electrical Machine Design Data
2 Book', New Age International Pvt. Ltd., Reprint, 2007.
3 R.K.Agarwal " Principles of Electrical Machine Design" Esskay Publications, Delhi, 2002.

E- Resources

1. http://www.motor-engineer.net/engineering-center/learn/tutorial-electric-machine-design-hendershot/

2. http://nptel.ac.in/courses/108106023/
3. https://www.youtube.com/watch?v=krNH7-wDnZk

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

1 Calculate the magnetic circuit parameters of electrical machines.
2 Design main dimension of DC machines, AC machines and transformer
3 based on power ratings
4 Design the internal dimensions of various electrical machines.
5 Evaluate the thermal ratings of electrical machines

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VI Semester		
Code: D0231	**ELECTRICAL ESTIMATION AND COSTING** (Professional Elective – II)	**L**	**T**	**P**
Credits:3		**3**	**-**	**-**

Prerequisites: Nil

Course Objectives:

To expose the subject highlights on elements of estimation and costing, budgeting of service connections andalso about contracting, maintenance.

MODULE I ELEMENTS OF ESTIMATING & COSTING OF DOMESTIC AND INDUSTRIAL WIRING **9 Periods**

Definition of ―Estimation, Types of estimation and estimation tools, Overhead and service charges, Purchase procedure. Layout and wiring diagram for residential building and industrial wiring, Selection of number of circuit for project as per IE rules, Estimation for residential wiring and industrial wiring, I.E. rules observed for above wiring.

MODULE II ESTIMATING & COSTING OF SERVICE CONNECTIONS **9 Periods**

Survey work for domestic and industrial service connection, Lay out/ wiring diagram of service connection (given project work), List of materials and accessories along with specifications required for given project work, Estimation of service connection for domestic and industrial (1phase and 3phase) service connections, I.E. rules pertaining to above wiring.

MODULE III ESTIMATION OF OVER HEAD AND UNDERGROUND DISTRIBUTION LINE **10 Periods**

A: Survey work for estimation of overhead and underground distribution system, Planning and layout of project, List of materials and accessories required for the given project.

B: Procedure for preparing estimate for 440 V, 3 phase, 4 wire or 3 wire overhead and underground distribution system, Necessary drawing/ sketches of overhead and underground service connection, I.E. rules pertaining to above project.

MODULE IV ESTIMATING & COSTING OF ELECTRICAL PRODUCT **10 Periods**

Market survey for cost of given product like D.O.L. starter, small motor, monoblock pump, automatic electric iron, table/ceiling fan, ICDP/ICTP switch etc, Preparation of detailed drawing work of the product, Preparation of material quantity sheet for the product, Market survey for availability of required materials, their cost and other requirements, Preparation of cost schedule of product, Find out cost of product considering material cost, labour cost and overhead charges, Validation of cost schedule, Financial arrangement for the product.

MODULE V ESTIMATING & COSTING OF REPAIR & MAINTENANCE OF ELECTRICAL DEVICES AND EQUIPMENT **10 Periods**

Location of fault, Materials required and their cost for remedial measure of fault, Estimation of repairing cost.Estimation of maintenance, servicing and testing cost including labourcost(service charge), Tools used for repairs & maintenance work, Detailed estimation and preparation of cost schedule for repair and maintenance of electric fan, automatic electric iron, single phase transformer, mixy, D.O.L.starter etc.

Text Books

1. S.L. Uppal, "Electrical Wiring, Estimating and Costing", Khanna Publisher
2. S.K. Bhattacharya ,"TTTI", Chandigarh.

References

1 M.N. Bajpai,“ Electrical estimating and costing” , Saroj publication.
2 S.O.Rs of P.W.D. Govt. departments.
3 I.E. rules gadget.
4 Electrical costing, estimating and contracting.

E- Resources

1. http://www.navodayaengg.in/study-material/eee/semester-viii/estimation-and-costing/
2. http://arieseee.blogspot.in/2013/04/electrical-installation-and-estimation.html
3. http://www.cercind.gov.in/ElectSupplyAct1948.pdf

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

1 Understand elements of estimating & costing of domestic and industrial wiring.
2 Comprehend the estimation of service connection for domestic and industrial service connections.
3 Analyze the estimation of overhead and underground distribution line.
4 Estimate and prepare the cost schedule for a given electrical product.
5 Understand the maintenance of electrical devices and principles of contracting.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VI Semester		
Code: D0232	SMPS AND UPS (Professional Elective– II)	L	T	P
Credits:3		3	-	-

Prerequisites: Power Electronics

Course Objectives:

This course deals with the Modern power electronic converters and its applications in electric power utility. Resonant converters and UPS

MODULE I BASIC CONVERTER CIRCUITS 9 Periods

Linear regulator Vs. Switching regulator – Topologies of SMPS – isolated and non isolated topologies – Buck – Boost – Buck boost – Cuk – Polarity inverting topologies – Push pull and forward converters half bridge and full bridge – Fly back converters Voltage fed and current fed topologies. EMI issues.

MODULE II SWITCHED MODE POWER CONVERTERS 9 Periods

Analysis and state space modeling of fly back, Forward, Push pull, Luo, Half bridge and fullbridge converters- control circuits and PWM techniques.

MODULE III RESONANT CONVERTERS 10 Periods

Introduction- classification- basic concepts- Resonant switch- Load Resonant converters-ZVS , Clamped voltage topologies- DC link inverters with Zero Voltage Switching- Seriesand parallel Resonant inverters- Voltage control.

MODULE IV DESIGN CONSIDERATIONS 10 Periods

Selection of output filter capacitor, Selection of energy storage inductor, Design of High Frequency Inductor and High frequency Transformer, Selection of switches. Snubber circuit design, Design of driver circuits.

MODULE V POWER CONDITIONERS, UPS & FILTERS 10 Periods

Introduction- Power line disturbances- Power conditioners –UPS: offline UPS, Online UPS, Applications – Filters: Voltage filters, Series-parallel resonant filters, filter without series capacitors, filter for PWM VSI, current filter, DC filters – Design of inductor and transformer for PE applications – Selection of capacitors.

Text Books

1. Simon Ang, Alejandro Oliva," Power-Switching Converters", Third Edition, CRC
2. Press, 2010.
3 KjeldThorborg, "Power Electronics – In theory and Practice", Overseas Press, First

References

1 Philip T Krein, " Elements of Power Electronics", Oxford University Press

2 Ned Mohan, Tore.M.Undeland, William.P.Robbins, Power Electronics converters,Applications and design- Third Edition- John Wiley and Sons- 2006

3 M.H. Rashid – Power Electronics circuits, devices and applications- third edition

4 Prentice Hall of India New Delhi, 2007.

E- Resources

1. https://nptel.ac.in/courses/108/108/108108036/
2. https://www.coursera.org/specializations/power-electronics
3. https://nptel.ac.in/content/storage2/courses/108105066/PDF/L33(DP)(PE)%20((EE)NPTEL).pdf

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

1 Analyze various modes of operation of Dc-Dc converter
2 Acquire knowledge on switched mode power converters.
3 Understand the importance of Resonant Converters.
4 Design various components of dc-dc converter
5 Acquire knowledge on filters and UPS

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	2	-	-	-	-	-	-	1	1	2	-	3
CO2	2	1	2	2	-	-	-	-	-	-	1	1	2	-	3
CO3	2	2	2	2	-	-	-	-	-	-	1	1	2	-	3
CO4	2	1	1	1	-	-	-	-	-	-	1	1	2	-	3
CO5	2	1	1	1	-	-	-	-	-	-	1	1	2	-	3

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VI Semester		
Code: D0233	BIOMEDICAL INSTRUMENTATION (Professional Elective– II)	L	T	P
Credits:3		3	-	-

Prerequisites: Basic Electronics, Instrumentation

Course Objectives:

- To Introduce Fundamentals of Biomedical Engineering
- To study the communication mechanics in a biomedical system with few examples
- To study measurement of certain important electrical and non-electrical parameters
- Tounderstandthebasicprinciplesinimagingtechniques To have a basic knowledge in life assisting and the rapeutic devices

MODULE I Fundamentals of Biomedical Engineering 9 Periods

Cell and its structure – Resting and Action Potential – Nervous system and its fundamentals -Basic components of a biomedical system- Cardiovascular systems- Respiratory systems -Kidney and blood flow - Biomechanics of bone - Biomechanics of soft tissues -Physiological signals and transducers-Transducers– selection criteria– Piezoelectric,ultrasonictransducers-Temperaturemeasurements-Fibreoptictemperaturesensors

MODULE II Non-Electrical Parameters Measurement and Diagnostic Procedures 9 Periods

Measurement of blood pressure - Cardiac output - Heart rate - Heart sound - Pulmonary function measurements – spirometer – Photo Plethysmography, Body Plethysmography – Blood Gas analysers, pH of blood –measurement of blood pCO2, pO2, finger-tip oxymeter - ESR, GSR measurements

MODULE III Electrical Parameters Acquisition and Analysis 9 Periods

Electrodes – Limb electrodes –floating electrodes – pregelled disposable electrodes - Micro, needle and surface electrodes – Amplifiers, Preamplifiers, differential amplifiers, chopper amplifiers – Isolation amplifier - ECG – EEG – EMG – ERG – Lead systems and recording methods – Typical waveforms - Electrical safety in medical environment, shock hazards – leakage current-Instruments for checking safety parameters of biomedical equipment.

MODULE IV Imaging Modalities and Analysis 9 Periods

Radio graphic and fluoroscopic techniques – Computer tomography – MRI – Ultrasonography – Endoscopy – Thermography –Different types of biotelemetry systems - Retinal Imaging - Imaging application in Biometric systems

MODULE V Life Assisting, Therapeutic and Robotic Devices 9 Periods

Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators – Diathermy – Heart – Lung machine – Audio meters – Dialysers – Lithotripsy - ICCU patient monitoring system - Nano Robots - Robotic surgery –Orthopedic prostheses fixation

Text Books

1. Leslie Cromwell, "Biomedical Instrumentation and Measurement", Prentice Hall of India, New Delhi, 2007.
2. Khandpur R.S, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, New Delhi,2nd edition, 2003
3. Joseph J Carr and John M.Brown, Introduction to Biomedical Equipment Technology, John Wiley and sons, New York, 4th edition, 2012

References

1 John G. Webster, Medical Instrumentation Application and Design, John Wiley and sons, New York, 1998.
2 Duane Knudson, Fundamentals of Biomechanics, Springer, 2nd Edition, 2007.
3 Suh, Sang, Gurupur, Varadraj P., Tanik, Murat M., Health Care Systems, Technology and Techniques, Springer, 1st Edition, 2011.
4 Ed. Joseph D. Bronzino, The Biomedical Engineering Hand Book, Third Edition, Boca Raton, CRC Press LLC, 2006.
5 M.Arumugam, 'Bio-Medical Instrumentation', Anuradha Agencies, 2003.

E- Resources

1. https://www.biomedicalinstrumentationsystems.com/the-introduction-to-biomedical-instrumentation/
2. https://www.medicalnewstoday.com/articles/cardiovascular-system#anatomy
3. https://www.ncbi.nlm.nih.gov/books/NBK279251/
4 http://www.nitjsr.ac.in/course_assignment/Biomedical%20Engineering_1.pdf
5 https://www.youtube.com/watch?v=0d_P5kXkAvE

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

1 Understand the philosophy of the heart, lung, blood circulation and respiration system.
2 Measure and analyze the non electricalbiomedical and physiological information
3 Understand and explain the working and concepts of ECG,EMG,EEG and ERG
4 Explain and analyze the modern methods of imaging techniques.
5 Explain the medical assistance/techniques, robotic and therapeutic equipments.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	1	-	-	-	-	-	1	2	-	2
CO2	3	3	2	2	2	1	-	-	-	-	-	1	2	-	3
CO3	3	2	2	2	2	1	-	-	-	-	-	1	2	-	3
CO4	3	2	1	1	2	1	-	-	-	-	-	1	2	-	3
CO5	3	2	1	1	2	1	-	-	-	-	-	1	2	-	3

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code:	**OPEN ELECTIVE – I**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VI Semester		
Code:D0H03	ENGLISH COMMUNICATION AND PRESENTATION SKILLS LAB (Common for EEE, ECE,CSE and IT)	L	T	P
Credits:1		-	-	2

Prerequisites:Nil

Course Objectives:

The learners need to be aware of the characteristics of technical communication in their workplaces; as a result, they are exposed to different channels of technical communication. Hence the acquired skills make thelearners effective communicators using persuasive language. Besides the above said, one of the major objectives is to maintain objectivity in writing documents and to produce professional quality documents using different components of the language.

Methodology:

Facilitator's role: Since classroom learning augments thinking process, helping them to develop written, spoken and non verbal communication, the facilitator / Faculty would briefly discuss the topics with the students and later on guide them while the students involved in activities, writing work and while making presentations. The facilitator is required to design a lot of practical/industry oriented project works for the students

*Students are required to participate, perform, write and submit the work in the form of written documents or Power Point Presentations to hone their spoken written and non verbal communication skills. Students are to take up field work and submit the project work.

MODULE I Oral Presentations 9 Periods

Mechanics of Presentations – Methodology of Presentation, Importance of Non-verbal communication during presentations– Nuances of Presentation.

*This particular module is for internal evaluation purpose(s).

MODULE II E - Correspondence and Social Media Etiquette 9 Periods

Common web mail services, yahoo, gmailetc, fields to pay attention- To:, Cc:, Bcc:, Reply All, Subject, Salutation, Body, Signature, Font, Caps Lock , Highlight, The 'KISS' strategy (Keep It Simple and Short,)Points to remember while signing off, Introduction to Technical Vocabulary, Cultural Differences

- This Module is purely for internal assessment/evaluation

MODULE III Group Discussion 9 Periods

.Initiators- Contributor-Informer-Team Leader-Motivator-Creative Contributor , Importance of , Non verbal communication -eye contact, voice characters, posture, gestures, do's and don'ts, Role play and Simulation- Learners assuming the roles of characters and participating in Group discussion, analysis, or prediction with strictly defined goals.

MODULE IV Interview Skills & Office Etiquette 9 Periods

Preparing for the interview, types of interviews, interview session, importance of non verbal communication during the interview, do's and don'ts of interview, follow up and thanking letter. FAQ's. Formal Conversation, office attire- do's and don'ts, greetings and meetings, speaking to seniors and handshakes, offering and taking visiting cards, Asking questions and Seeking Clarifications.

MODULE V Career Progression 9 Periods

Job Hunt Process-SWOT analysis, correspondence and browsing the internet to search for a suitable job(s), job application-cover letter drafting, drafting a winning resume', types of resume's

-electronic, video and printed resume's

- Instruction: Students are required to prepare their video resume which will be assessed by the faculty member.

References

1. Chrissie: **Handbook of Practical Communication Skills**: Jaico Publishing house, 1999.
2. Daniels, Aubrey: **Bringing Out the Best in People**: Tata McGraw-Hill: New York, 2003.
3. Wright, Goulstone, Mark: **Just Listen: Discover the Secret to getting through to absolutely anything** : American Management Association, 2010.
4. Leslie. T. Giblin: **Skill with people** Publication details not known
5. Lewis, Norman: **Word Power Made Easy**: Goyal Publications: New Delhi, 2009.
6. Murthy, A.G, Krishna,:**Ten Much** : Tata McGraw-Hill :New Delhi, 2010.

E- Resources

1. http://www.mindtools.com/pages/article/newTMC_05.htm
2. http://www.kent.ac.uk/careers/intervw.htm
3. http://www.wikihow.com/Write-a-Report

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

1 Give Oral Presentations Confidently.
2 Draft appropriate Resume in accordance with the context.
3 Participate and present their view and ideas logically and confidently.
4 Understand the importance of communication in various settings.
5 Utilize the technology for career advancement.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	1	-	-	-	-	2	-	2	-	-	-
CO2	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-
CO3	-	-	-	-	-	-	-	-	-	2	-	2	-	-	-
CO4	-	-	-	-	1	1	-	-	1	2	-	2	-	-	-
CO5	-	-	-	1	1	-	-	-	1	2	-	2	-	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VI Semester		
Code: D0219	ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LAB	L	T	P
Credits: 1		-	-	2

Prerequisites: Nil

To impart the basic knowledge of measuring instruments. To train the students to have the solid foundation in measuring the basic electrical elements like resistance, inductance, capacitance and measurement of power and energy.

Course Objectives:

impart the basic knowledge of measuring instruments. To train the students to have the solid foundation in measuring the basic electrical elements like resistance, inductance, capacitance and measurement of power and energy.

List of Experiments:

1. Calibration and Testing of single phase energy meter.
2. Calibration of dynamometer power factormeter.
3. Calibration of LVDT.
4. Measurement of Resistance using Kelvin's Double Bridge.
5. Measurement of Capacitance using Schering Bridge & De-Sauty Bridge.
6. Measurement of Inductance using AndersonBridge& Maxwell's Bridge.
7. Measurement of 3 phases reactive power with singlewattmeter.
8. Measurement of choke coil parameters using 3 voltmeter and 3 ammeter method.
9. Calibration of LPF wattmeter by PhantomLoading.
10. Measurement of 3 phases power with single wattmeter and Two Watt Meter method.
11. Calibration of single phaseenergy Meter by PhantomLoading.
12. Measurement of Strain by using Resistance strain gauge.

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

1 Calibrate the single phase energy meter, power factor meter and LVDT.
2 Measure resistance by using various bridges.
3 Determine the inductance, capacitance by using various bridges.
4 Calibrate the energy meters by phantom loading.
5 Measure the three phase power by different methods.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	3	-	-	3	1	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VI Semester		
Code: D0220	POWER ELECTRONICS LAB	L	T	P
Credits: 1		-	-	2

Prerequisites: Nil

Course Objectives:

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

List of Experiments:

1. Study of Characteristics of SCR, MOSFET & IGBT.
2. Gate firing circuits for SCR.
3. Single Phase AC Voltage Controller with R and RL Loads.
4. Single Phase fully controlled bridge converter with R and RL loads.
5. Forced Commutation circuits (Class A, Class B, Class C, Class D & Class E).
6. DC Jones chopper with R and RL Loads.
7. Single Phase Parallel, inverter with R and RL loads.
8. Single Phase Cycloconverter with R and RL loads.
9. Single Phase Half controlled converter with R and RL load.
10. Three Phase half controlled bridge converter with R and RL load.
11. Single Phase dual converter with RL loads.
12. PSPICE simulation of single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads and also of resonant pulse commutation circuit and Buck chopper.

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

1 Analyze the AC voltage controller with R and RL Loads.
2 Analyze the different commutation circuits.
3 Understand the operating principles of various power electronic converters.
4 Use power electronic simulation packages& hardware to develop the power converters.
5 Analyze and choose the appropriate converters for various applications.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	2	-	-	2	1	-	-
CO2	3	3	3	3	-	-	-	-	2	-	-	2	1	-	-
CO3	3	3	3	3	-	-	-	-	2	-	-	2	1	-	-
CO4	3	3	3	3	-	-	-	-	2	-	-	2	1	-	-
CO5	3	3	3	3	-	-	-	-	2	-	-	2	1	-	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B. Tech. VI Semester		
Code: D00M4	QUANTITATIVE APTITUDE AND VERBAL REASONING – II	L	T	P
Credits: Nil	(Common for All Branches)	1	1	-

Module – I **8 Periods**

Quants: Number System (NS)

- **Number Systems-**Factors and Multiples: The H.C.F. of two or more than two numbers; Factorization Method Division Method; Finding the H.C.F. of more than two numbers; product of two numbers = Product of their H.C.F. and L.C.M.; Co-primes; H.C.F. and L.C.M. of Fractions:Comparison of Fractions.

Verbal: Articles, Para Jumbles

- **Articles-** Types of articles, Countable nouns, Uncountable nouns, Usage of articles, Omission of articles.
- **Para Jumbles**- Para Jumbles, Types of Para Jumbles, Strategies to answer questions on Jumbled Paragraphs.

Logical: Data Arrangements, Blood Relation

- **Data Arrangements-** Linear Arrangement, Circular Arrangement, Multi-Dimensional Arrangement.
- **Blood Relations-** Classification of blood relations, Pointing a person, Equation related problems.

Module – II **6 Periods**

Quants: Time and Distance, Pipes

- **Time & Distance-**;Km/hr to m/sec conversion; m/sec to km/hr conversion**;** man covers a certain distance at x km/hr and an equal distance at y km/hr

Verbal: Sentence Completion, Prepositions

- **Sentence Completion-** Formats of Question; Strategies to solve sentence completion questions- Proactive and reactive solving, Identifying clues- Signposts, Types of signposts, Root words, Sentence structure clues.
- **Prepositions-** Definition, Types of prepositions, Preposition of Place, Preposition of Time, Preposition of Direction, Compound Prepositions, Prepositional Phrases.

Logical: Coding and Decoding

- **Coding and Decoding-**Number Series, Alphabet Series, Analogy, Odd Man Out, Visual Reasoning.

Module–III **6 Periods**

Quants: Ages, Progression, Logarithms

- **Ages, Progression-**;Arithmetic progression; Arithmetic mean; Geometric progression and mean

- **Logarithms-**Why logarithms: Properties of Logarithms: Laws of logarithm: Characteristic of logarithm:

Verbal: Vocabulary

- **Vocabulary**-Etymology, Root Words, Prefixes and Suffixes; Synonyms and Antonyms, Tips to solve questions on Synonyms and Antonyms; Word Analogy, Patterns of questions on Word Analogy; Miscellaneous Vocabulary.

Logical: Data Interpretation and Data Sufficiency

- **Data Interpretation**- Tables, Pie charts, Bar Graphs, Line graphs
- **Data Sufficiency**-Strategies to solve.

Module – IV **6 Periods**

Quants: Permutations and Combinations, Probability

- **Permutations**-Factorial Notation:The different arrangements; Number of Permutations: number of all permutations of n things, taken all at a time; n subjects of which p_1 are alike of one kind; p_2 are alike of another kind; p_3 are alike of third kind; Number of Combinations: The number of all combinations of n things, taken r at a time.

Verbal: Sentence Correction

- **Sentence Correction**- Subject-Verb Agreement; Modifiers; Parallelism; Pronoun-Antecedent Agreement; Verb Time Sequence; Comparisons; Determiners; Exercise Questions.

Logical: Clocks and Calendars

- **Clocks:**Introduction, Derivation of angles, Angles between hands of the clock, Hands together, Hands at angular distance, Gain & Loss problems.
- **Calendars:** - Leap year-Non leap year, Odd days, Finding the day from date, Repeated years.

Module - V: **6 Periods**

Quants: Areas and Volumes (Mensuration)

- **Areas & Volumes**-Pythagoras Theorem Results on Quadrilaterals Perimeter; Area of a circle Circumference Length of an arc Area of a sector; Area of a triangle.

Verbal: Reading Comprehension, Critical Reasoning

- **Reading Comprehension**- Speed reading strategies; Reading Comprehension - types of questions, tackling strategies; Critical Reasoning.

Logical: Directions, Cubes, Syllogisms

- **Directions** -Introduction, Direction based questions, Shadow based problems.
- **Cubes**- Cube & cuboid concepts, 3-2-1-0 faced problems.
- **Syllogisms**- Statements and Conclusion, Syllogisms using Venn Diagrams.

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B. Tech. VI Semester		
Code: D00M5	CONSTITUTION OF INDIA (Common for All Branches)	L	T	P
Credits: Nil		3		-

Course Objectives: Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes: Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
- Discuss the passage of the Hindu Code Bill of 1956.

Unit - 1 History of Making of the Indian Constitution- History of Drafting Committee.
Unit - 2 Philosophy of the Indian Constitution- Preamble Salient Features
Unit - 3 Contours of Constitutional Rights & Duties - Fundamental Rights

- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

Unit - 4 Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Unit - 5 Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit - 6 Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Suggested Reading:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VI Semester		
Code: D00P1	INDUSTRY ORIENTED MINI PROJECT / INTERNSHIP	L	T	P
Credits:2		-	-	4

SEMESTER – VII

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VII Semester		
Code: D0221	POWER SYSTEM OPERATION AND CONTROL	L	T	P
Credits:3		3	-	-

Prerequisites: Electrical Power Generation System, Power System Analysis, AC Machines..

Course Objectives:

This subject deals with Economic operation of Power Systems, Hydrothermal scheduling and modeling of governors, turbines and generators. It emphasizes on single area and two area load frequency control and reactive power control.

MODULE I PRELIMINARIES ON POWER SYSTEM OPERATION AND CONTROL 10 Periods

Power scenario in Indian grid – National and Regional load dispatching centers – requirements of good power system - necessity of voltage and frequency regulation - real power vs frequency and reactive power vs voltage control loops - system load variation, load curves and basic concepts of load dispatching - load forecasting - Basics of speed governing mechanisms and modeling - speed load characteristics - regulation of two generators in parallel.

MODULE II REAL POWER - FREQUENCY CONTROL 9 Periods

Load Frequency Control (LFC) of single area system-static and dynamic analysis of uncontrolled and controlled cases - LFC of two area system - tie line modeling - block diagram representation of two area system - static and dynamic analysis - tie line with frequency bias control – state variability model.

MODULE III REACTIVE POWER – VOLTAGE CONTROL 10 Periods

Generation and absorption of reactive power - basics of reactive power control – Automatic Voltage Regulator (AVR) – brushless AC excitation system – block diagram representation of AVR loop - static and dynamic analysis – stability compensation – voltage drop in transmission line - methods of reactive power injection - tap changing transformer, SVC (TCR + TSC) and STATCOM for voltage control.

MODULE IV ECONOMIC OPERATION OF POWER SYSTEM 10 Periods

Statement of economic dispatch problem - input and output characteristics of thermal plant - incremental cost curve - optimal operation of thermal units without and with transmission losses (no derivation of transmission loss coefficients) - base point and participation factors method - statement of unit commitment (UC) problem - constraints on UC problem – solution of UC problem using priority list.

MODULE V COMPUTER CONTROL OF POWER SYSTEMS 9 Periods

Need of computer control of power systems-concept of energy control centers and functions – PMU - system monitoring, data acquisition and controls - System hardware configurations - SCADA and EMS functions - state estimation problem – various operating states - state transition diagram.

Text Books

1. Olle.I.Elgerd, 'Electric Energy Systems theory - An introduction', McGraw Hill Education Pvt. Ltd., New Delhi, 34th reprint, 2010.
2. Allen. J. Wood and Bruce F. Wollen berg, 'Power Generation, Operation and Control', John Wiley & Sons, Inc., 2016.
3. Abhijit Chakrabarti and Sunita Halder, 'Power System Analysis Operation and Control', PHI learning Pvt. Ltd., New Delhi, Third Edition, 2010.

4. Kundur P., 'Power System Stability and Control, McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.

References

1. Kothari D.P. and Nagrath I.J., 'Power System Engineering', Tata McGraw-Hill Education, Second Edition, 2008.
2. Hadi Saadat, 'Power System Analysis', McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.
3. J.Duncan Glover and M.S.Sarma,—Power System Analysis and Design", THOMPSON, 3 rd Edition.

E- Resources

1. https://nptel.ac.in/courses/108/101/108101040/
2. https://www.youtube.com/watch?v=zkN13OmgGOs

Course Outcomes

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

1. Understand the day-to-day operation of electric power system and the significance of power system operation and control.
2. Analyze the control actions to be implemented on the system to meet the minute-to-minute variation of system demand and acquire knowledge on real power-frequency interaction.
3. Describe the reactive power control of a power system and analyze its interaction with voltage.
4. Evaluate the economic operation of thermal units by using economic dispatch and unit commitment methods.
5. **Understand** SCADA and EMS system for power system operation and control

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VIISemester		
Code:D0222	SWITCHGEAR AND PROTECTION	L	T	P
Credits:3		3	-	-

Prerequisites: DC Machines & Transformers, AC Machines, Power Generation and Distribution.

Course Objectives:

This course deals with different kinds of circuit breakers and relays for protection of generators, transformers and feeder bus bars from over voltages and other hazards. It also emphasis on Neutral grounding for overall protection.

MODULE I Circuit Breakers 13 Periods

Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages - Restriking Phenomenon, Average and Max. RRRV, Numerical Problems - Current Chopping and Resistance Switching - CB ratings and Specifications-Construction and Operation of Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers-Numerical problems.

MODULE II Relays 13 Periods

Principle of Operation and Construction of Attracted armature, Balanced Beam, induction Disc and Induction Cup relays. Relays Classification: Instantaneous, DMT and IDMT types.

Application of relays: Over current/ under voltage relays, Direction relays, Differential Relays and Percentage Differential Relays.

Universal torque equation, Distance relays: Impedance, Reactance and Mho and Off-Set Mho relays, Characteristics of Distance Relays and Comparison, Numeric Relays

Static Relays: Static Relays versus Electromagnetic Relays.

MODULE III System Protection 13 Periods

A: Protection of Generators: Stator fault protection, Rotor fault protection, Restricted Earth fault and Inter-turn fault Protection, Numerical Problems on % WindingUnprotected. Protection of Transformers: Percentage Differential Protection, Numerical Problems on Design of CT Ratio, Buchholtz relay Protection.

B: Protection of Feeders: Over Current, Carrier Current and Three-zone distance relay protection using Impedance relay, Translay Relay.Protection of Bus bars: Differentialprotection.

MODULE IV Neutral Grounding 12 Periods

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

MODULE V Protection Against Over Voltages 13 Periods

Generation of Over Voltages in Power Systems.-Lighting Phenomenon-Protection against Lightning Over Voltages

Valve type and Zinc-Oxide Lighting Arresters - Insulation Coordination -BIL, Impulse Ratio, Standard Impulse Test Wave, Volt-Time Characteristics.

Text Books

1. Sunil S. Rao, "Switchgear and Protection and Power System", 13th Edition, Khanna Publishers, New Delhi, 2008.
2. Soni, M.L., Gupta, P.V., Bhatnagar, U.S. and Chakrabarti, **"A Text Book on Power Systems Engineering"**, Dhanpat Rai & Sons Company Limited, New Delhi, 2nd Edition, 2003.

References

1. Badari Ram, D.N Viswakarma, **"Power System Protection and Switchgear**" Tata McGraw Hill, 2nd Edition, 2010.
2. C.L.Wadhwa, **"Electrical Power Systems"**, New Age international (P) Limited, 4th edition, 2006.
3. Paithankar and S.R.Bhide , **"Fundamentals of Power System Protection"**, Prentice Hall of India, 2nd Edition 2003.
4. B. Ravindranath, and M. Chander, **"Power System Protection & Switchgear"**, 2nd Edition, New Age International, 2005.
5. S. L. Uppal, **"Electrical Power"**, 13thEdition, Khanna Publishers, New Delhi, 2006.

E- Resources

1. https://www.electrical4u.com/electrical-switchgear-protection/
2. http://www.electricity-today.com/
3. http://nptel.ac.in/downloads/108101039/

Course Outcomes

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

1. Analyze the operation of various types of circuit breakers.
2. Identify Characteristics of Relay for specific applications of protection.
3. Design the feasible protection systems for generators, transformers, feeders and bus bars.
4. Emphasis on Grounding practices in real time.
5. Investigate the fundamentals of protection against over voltages.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VII semester		
Code:D0234	**Non- Conventional Energy Sources** (Professional Elective– III)	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course Objectives:

The objective of this subject is to provide knowledge about different non-conventional energy sources.

MODULE I PRINCIPLES OF SOLAR RADIATION 10 Periods

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.

MODULE II SOLAR ENERGY COLLECTORS 10 Periods

Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

MODULE III SOLAR ENERGY STORAGE AND APPLICATIONS 9 Periods

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

MODULE IV WIND ENERGY & BIOMASS 10 Periods

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performancecharacteristics, Betz criteria.

BIO-MASS : Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gasdigesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects

MODULE V GEOTHERMAL ENERGY & OCEAN ENERGY 10 Periods

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.

OCEAN ENERGY: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

Text Books

1. Joshua Earnest, Tore Wizeliu, 'Wind Power Plants and Project Development', PHI Learning Pvt.Ltd, New Delhi, 2011.
2. D.P.Kothari, K.C Singal, Rakesh Ranjan "Renewable Energy Sources and Emerging Technologies", PHI Learning Pvt.Ltd, New Delhi, 2013.
3. Scott Grinnell, "Renewable Energy & Sustainable Design", CENGAGE Learning, USA, 2016.

References

1. A.K.Mukerjee and Nivedita Thakur," Photovoltaic Systems: Analysis and Design", PHI Learning Private Limited, New Delhi, 2011
2. Richard A. Dunlap," Sustainable Energy" Cengage Learning India Private Limited, Delhi, 2015.
3. Chetan Singh Solanki, " Solar Photovoltaics : Fundamentals, Technologies and Applications", PHI Learning Private Limited, New Delhi, 2011
4. Bradley A. Striebig,AdebayoA.Ogundipe and Maria Papadakis," Engineering Applications

in Sustainable Design and Development", Cengage Learning India Private Limited, Delhi, 2016.
5. Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in association with the Open University, 2004.
6. Shobh Nath Singh, 'Non-conventional Energy resources' Pearson Education ,2015.

E- Resources

1. **https://nptel.ac.in/courses/121/106/121106014/**
2. **https://nptel.ac.in/courses/103/103/103103206/**

Course Outcomes

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

1. Understand the principles of solar radiation
2. Understand the principles of solar collectors
3. Recognize solar collectors, Solar energy storage and its applications
4. Classify the harvesting of wind energy & bio-mass energy.
5. Understand the harvesting of geothermal energy & ocean energy

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO2	1	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO3	1	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO4	1	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO5	1	-	-	-	-	3	3	-	-	-	-	3	-	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VII Semester		
Code:D0235	ELECTRICAL HYBRID VEHICLES (Professional Elective – III)	L	T	P
Credits:3		3	-	-

Prerequisites: DC Machines and Transformers and AC Machines.

Course Objectives:
To present a comprehensive overview of Electric and Hybrid Electric Vehicles

MODULE I Introduction to Hybrid Electric Vehicles 10 Periods

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies. Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, and mathematical models to describe vehicle performance.

MODULE II Hybrid Electric Drive-trains 10 Periods

Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis. 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.

MODULE III Electric Propulsion unit &Energy Storage 10 Periods

A:Electric Propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives

B: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, Hybridization of different energy storage devices.

MODULE IV Sizing the drive system 9 Periods

Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power

MODULE V Communications, supporting subsystems 9 Periods

Communications, supporting subsystems: In vehicle networks- CAN, 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.

Text Books

1. Iqbal Hussein, **Electric and Hybrid Vehicles: Design Fundamentals**, CRC Press, 2003

References

1. James Larminie, John Lowry, **Electric Vehicle Technology Explained**, Wiley, 2003.
2. 2. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, **Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design,** CRC Press, 2004

E- Resources

1. https://en.wikipedia.org/wiki/Digital_library
2. https://ieeexplore.ieee.org/document/4168013/
3. www.ieahev.org/
4. web.mit.edu/evt/links.html

Course Outcomes

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

1. Choose a suitable drive scheme for developing an electric hybrid vehicle depending on resources
2. Design and develop basic schemes of electric vehicles and hybrid electric vehicles.
3. Choose proper energy storage systems for vehicle applications
4. Identify various communication protocols and technologies used in vehicle networks
5. Develop new technologies to generate electrical energy

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERING COLLEGE	B.Tech. VII Semester		
Code: D0236	ELECTRICAL DISTRIBUTION SYSTEM (Professional Elective– III)	L	T	P
Credits:3		3	-	-

Prerequisites: Power System – I, Power System - II

Course Objectives:

To understand design considerations of feeders ,compute voltagedrop and power loss in feeders and understand protection, PF improvement and voltage control

MODULE I GENERAL CONCEPTS **9 Periods**

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.

MODULE II SUBSTATIONS **9 Periods**

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).

System Analysis: Voltage drop and power-loss calculations: Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines, analysis of non-three phase systems, method to analyze the distribution feeder cost.

MODULE III PROTECTION **10 Periods**

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 Recloser - and Auto-line sectionalizes, and circuit breakers.

Coordination: Coordination of Protective Devices: Objectives of protection co-ordination, general coordination procedure, Types of protection coordination: Fuse to Fuse, Auto-Recloser to Fuse, Circuit breaker to Fuse, Circuit breaker to Auto-Recloser.

MODULE IV COMPENSATION FOR POWER FACTOR IMPROVEMENT **9 Periods**

Capacitive compensation for power-factor control -Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed andswitched), 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.

MODULE V VOLTAGE CONTROL **9 Periods**

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, voltage fluctuations.

Text Books

1. Turan Gonen, Electric Power Distribution System Engineering, CRC Press, 3rd Edition 2014.
2. V. Kamaraju, Electrical Power Distribution Systems, Tata Mc Graw Hill Publishing Company, 2nd edition, 2010.

References

1. G. Ram Murthy, Electrical Power Distribution hand book, 2nd edition, University press 2004.
2. A.S. Pabla, Electric Power Distribution, Tata McGraw Hill Publishing company, 6th edition, 2013.

Course Outcomes

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

1. Understand design considerations of feeders.
2. Design the feeders and compute power loss and voltage drop of the feeders.
3. Design protection of distribution systems
4. Understand protection, PF improvement
5. Understand the importance of voltage control

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VII semester		
Code: D0237	MODERN POWER CONVERTERS (Professional Elective– III)	L	T	P
Credits:3		3	-	-

Prerequisites: Power Electronics, Electrical Drives

Course Objectives:

This course deals with the Modern power electronic converters and its applications in electric power utility. Resonant converters and UPS

MODULE I SWITCHED MODE POWER SUPPLIES (SMPS) 9 Periods

DC Power supplies and Classification; Switched mode dc power supplies - with and without isolation, single and multiple outputs; Closed loop control and regulation; Design examples on converter and closed loop performance.

MODULE II AC-DC CONVERTERS 10 Periods

Switched mode AC-DC converters. synchronous rectification - single and three phase topologies – switching techniques - high input power factor . reduced input current harmonic distortion. improved efficiency. with and without input-output isolation. performance indices design examples

MODULE III DC-AC CONVERTERS 9 Periods

Multi-level Inversion - concept, classification of multilevel inverters, Principle of operation,main features and analysis of Diode clamped, Flying capacitor and cascaded multilevelinverters; Modulation schemes.

MODULE IV AC-AC CONVERTERS WITH AND WITHOUT DC LINK 10 Periods

Matrix converters. Basic topology of matrix converter; Commutation – current path; Modulation techniques - scalar modulation, indirect modulation; Matrix converter as only AC-DC converter; AC-AC converter with DC link - topologies and operation - with and without resonance link – converter with dc link converter; Performance comparison with matrix converter with DC link converters.

MODULE V SOFT-SWITCHING POWER CONVERTERS 9 Periods

Soft switching techniques. ZVS, ZCS, quasi resonance operation; Performance comparison hard switched and soft switched converters.AC-DC converter, DC-DC converter, DC-AC converter.; Resonant DC power supplies .

Text Books

1. Power Electronics Handbook, M.H.Rashid, Academic press, New york, 2000.
2. Advanced DC/DC Converters, Fang Lin Luo and Fang Lin Luo, CRC Press, NewYork, 2004.
3. Control in Power Electronics- Selected Problem, Marian P.Kazmierkowski,R.Krishnan and FredeBlaabjerg, Academic Press (Elsevier Science), 2002.

References

1. Philip T Krein, " Elements of Power Electronics", Oxford University Press
2. Ned Mohan, Tore.M.Undeland, William.P.Robbins, Power Electronics converters,Applications and design- Third Edition- John Wiley and Sons- 2006
3. M.H. Rashid – Power Electronics circuits, devices and applications- third edition Prentice Hall of India New Delhi, 2007.
4. Erickson, Robert W, "Fundamentals of Power Electronics", Springer, second edition, 2010.

E- Resources

1. https://nptel.ac.in/courses/108/102/108102157/
2. https://www.coursera.org/specializations/power-electronics

3. https://nptel.ac.in/courses/108/107/108107128/

Course Outcomes

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

1. Analyze the state space model for DC – DC converters
2. Acquire knowledge on switched mode power converters.
3. Understand the importance of Resonant Converters.
4. Analyze the PWM techniques for DC-AC converters
5. Acquire knowledge on filters and UPS

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VII semester		
Code: D0238	POWER SYSTEMS TRANSIENTS (Professional Elective– III)	L	T	P
Credits:3		3	-	-

Prerequisites: Power Systems

Course Objectives:

To impart knowledge about the following topics:

- Generation of switching transients and their control using circuit–theoretical concept.
- Mechanism of lighting strokes and the production of lighting surges.
- Propagation,reflection and refraction of travelling waves.
  Voltage transients caused by faults,circuitbreak erection,load rejection on integrated power system.

MODULE I SWITCHING TRANSIENTS 10 Periods

Review and importance of the study of transients-causes for transients. RL circuit transient with sine wave excitation - double frequency transients - basic transforms of the RLC circuit transients. Different types of power system transients - effect of transients on power systems –role of the study of transients in system planning.

MODULE II AC-DC CONVERTERS 10 Periods

Over voltages due to switching transients - resistance switching and the equivalent circuit forInterrupting the resistor current - load switching and equivalent circuit – waveforms for transientvoltage across the load and the switch normal and abnormal switching transients. Currentsuppression - current chopping effective equivalent circuit. Capacitance switching - effect ofsource regulation – capacitance switching with a restrike, with multiple restrikes.

MODULE III LIGHTNING TRANSIENTS 10 Periods

A-Review of the theories in the formation of clouds and charge formation - rate of charging of thunder clouds –mechanism of lightning discharges and characteristics of lightning strokes

B-model for lightning stroke - factors contributing to good line design - protection using ground wires -towerfootingresistance

MODULE IV TRAVELING WAVES ON TRANSMISSION LINE COMPUTATION OF TRANSIENTS 10 Periods

Computation of transients - transient response of systems with series and shunt lumped parameters and distributed lines. Traveling wave concept - step response - Bewely's lattice diagram - standing waves and natural frequencies - reflection and refraction of travelling waves.

MODULE V TRANSIENTSININTEGRATEDPOWERSYSTEM 9 Periods

The short line and kilometric fault - distribution of voltages in a power system Line dropping and load rejection-voltage transients onclosing and reclosing lines–overvoltage Induced by Faults-switching surges on integrated system Qualitative application of EMTP fort ransien tcomputation

Text Books

1. AllanGreenwood,'ElectricalTransientsinPowerSystems',WileyInterScience,NewYork,2nd Edition,1991.
2. Pritindra Chowdhari,"Electromagnetic transients in Power System",JohnWileyand SonsInc.,Second Edition,2009.
3. C.S.Indulkar,D.P.Kothari,K.Ramalingam,'Power System Transients–A statistical approach',

PHILearning PrivateLimited,SecondEdition,2010.

References

1. M.S.NaiduandV.Kamaraju,'High Voltage Engineering',McGrawHill ,FifthEdition,2013.
2. R.D.Begamudre,'Extra High Voltage AC Transmission Engineering',WileyEastern Limited, 1986.
3. J.L.Kirtley,"Electric Power Principles,Sources,Conversion,Distributionanduse,"Wiley,2012.
4. Akihiroametani,"Power System Transient theory and applications",CRCpress,2013.

E- Resources

1. https://www.dsengg.ac.in/eee/08%20POWER%20SYSTEM%20TRANSIENTS(KP).pdf
2. https://easyengineering.net/ee6002-power-system-transients/
3. https://learnengineering.in/ee8010-power-systems-transients/
4. https://www.notesforgeeks.in/2021/08/ee8010-power-systems-transients-syllabus-2017-regulation.html http://nptel.ac.in/courses/108106072/

Course Outcomes

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

1. Understand and analyze switching and lightning transients.
2. Acquire knowledge on generation of switching transients and their control.
3. Analyze the mechanism of lighting strokes.
4. Understand the importance of propagation,reflection and refraction of travelling waves.
5. Find the voltage transients caused by faults.

CO-PO Mapping

CO-PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	-	-	-	-	-	-	-	2	1	-	1
CO2	2	3	2	2	-	-	-	-	-	-	-	2	1	-	1
CO3	3	3	3	2	-	-	-	-	-	-	-	2	1	-	1
CO4	3	3	2	3	-	-	-	-	-	-	-	3	2	-	1
CO5	3	2	2	2	-	-	-	-	-	-	-	2	1	-	1

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VII Semester		
Code: D0239	UTILIZATION OF ELECTRICAL ENERGY (Professional Elective - IV)	L	T	P
Credits:3		3	-	-

Prerequisites: Power Generation and Distribution System, DC Machines and Transformers & AC Machines.

Course Objectives:

This course deals with the fundamentals of illumination, electric heating and welding. It also emphasis on different kinds of electric drives, electric drive vehicles and their application to electrical traction systems.

MODULE I Electric Heating and Welding 10 Periods

Advantages and methods of electric heating, resistance heating, induction heating and dielectric heating. Electric welding, resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding.

MODULE II Illumination 10 Periods

Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light. Discharge lamps, MV and SV lamps – Comparison between LED lamps and fluorescent tubes. Basic principles of light control - Types and design of lighting and flood lighting.

MODULE III Electric Traction – I 10 Periods

System of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor.

Methods of electric braking – Plugging, rheostatic braking and regenerative braking.

MODULE IV Electric Traction-II 9 Periods

Mechanics of train movement. Speed-time curves for different services – Trapezoidal and quadrilateral speed time curves. Calculations of tractive effort, power, specific energy consumption for given run. Effect of varying acceleration and braking retardation, adhesive weight and braking retardation, adhesive weight and coefficient of adhesion.

MODULE V Electric Drive Vehicles 9 Periods

Concept of electric drive vehicles and types – Batteryelectric vehicles, hybrid vehicles, plug-in hybrid electric vehicles and All-Electric vehicles. Benefits of electric drive vehicles.

Text Books

1. M.L. Soni, P.V. Gupta, V.S. Bhatnagar and A. Chakrabarti, **"A Text Book on PowerSystem Engineering"**, Dhanpat Rai & Co., 2nd Edition, 2014.
2. Partab, **"Art & Science of Utilization of Electrical Energy",**Dhanpat Rai & Sons, 3rd Edition, 2006.

References

1. N.V.Suryanarayana, **"Utilization of Electrical Power Including Electric Drives andElectric Traction"**, New Age International (P) Limited, 1996.
2. C.L.Wadhwa, **"Generation, Distribution and Utilization of Electrical Energy",** New Age International (P) Limited, 1997.
3. J.B.Gupta, **"Utilisation Electric Power and Electric Traction"**, S.K.Kataria and Sons, 2000.
4. R.K.Rajput, **"Utilisation of Electric Power"**, Laxmi Publications Private Limited, 2007.
5. E. Openshaw Taylor, **"Utilisation of Electric Energy",** Orient Longman, 1st Edition, 2006.

E- Resources

1. http://www.intelligent-power-today.com/
2. http://www.electricity-today.com/
3. http://nptel.ac.in/syllabus/108103009/

Course Outcomes

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

CO1	***Illustrate*** different process of utilizing electric energy for heating and welding process in industries for commercial purposes along with few house hold applications	Understand	L2
CO2	***Classify types*** of electric light sources based on nature of operation and to ***determine***its MHCP and MSCP.	Evaluate	L5
CO3	***Choose proper*** traction systems depending upon application considering economic and technology up-gradation and ***calculate*** tractive effort, power, specific energy consumption for given run	Apply	L3
CO4	***Employ appropriate*** mathematical and graphical analysis considering different practical issues in designing traction system; ***analyze*** the performance parameter of the traction system.	Analyze	L4
CO5	***Explain*** the basics of electric and hybrid electric vehicles, their architecture, technologies, fundamentals and **analyze** various electric drives suitable for electric vehicles.	Understand	L4

CO-PO Mapping

(3/2/1 indicates strength of correlation)
3-Strong, 2-Medium, 1-Weak

COs	Program Outcomes (Pos)												PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	1	1	2	3	2	2	-	-	-	-	1	3	2	-
2	3	2	2	2	3	1	2	-	-	-	-	1	3	2	-
3	3	2	2	2	3	1	2	-	-	-	2	1	3	2	1
4	3	2	2	3	3	-	2	2	-	-	1	-	2	2	-
5	3	2	2	3	3	1	3	2	-	-	1	1	2	1	1

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VII Semester		
Code: D0240	HVDC AND FACTS (Professional Elective-IV)	L	T	P
Credits:3		3	-	-

Prerequisites: Power Generation & Distribution, Power System Analysis and Control and Power Electronics.

Course Objectives:

This course deals with the basic concepts of HVDC transmission system, its applications and analysis of HVDC converters with their control circuitry. It also emphasizes on reactive power control in HVDC system using FACTS devices.

MODULE I Introduction 10 Periods

Economics & terminal equipment of HVDC transmission systems: Types of HVDC links – Apparatus required for HVDC systems – Comparison of AC & DC transmission, application of DC transmission System – typical layout of a HVDC converter station-Planning & modern trends in D.C. transmission.

MODULE II Analysis of HVDC Converters 10 Periods

Choice of converter configuration – Analysis of Graetz – Characteristics of 6 Pulse & 12 Pulse converters – Cases of two 3 phase converters in star-star mode and their performance.

Converter & HVDC System Control:

Principle of DC link control – Converters control characteristics – Firing angle control – Current and extinction angle control – Effect of source inductance on the system. Starting and stopping of DC link - Power Control.

MODULE III Reactive Power Control in HVDC 10 Periods

A: Reactive Power Requirements in steady state - Conventional control strategies – Alternate control strategies - Sources of reactive power - AC Filters – Shunt capacitors – Synchronous Condensers.

B: Power Flow Analysis in AC/DC Systems :

Modeling of DC links - DC network - DC converter - Controller equations - Solution of DC load flow – P.U. system for DC quantities - Solution of AC-DC power flow - Simultaneous method Sequential method.

MODULE IV Power Flow and Dynamic Stability 9 Periods

Transmission interconnections, power flow in an AC System, loading capability limits, power flow and dynamic stability considerations, importance of controllable parameters. Opportunities for FACTS, basic types of FACTS controllers, benefits from FACTS controllers. Requirements and characteristics of high power devices – Voltage and current rating, losses and speed of switching, parameter trade - off of devices.

MODULE V STATIC SERIES COMPENSATORS 9 Periods

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

Text Books

1. K.R.Padiyar, **"HVDC Power Transmission Systems"**, New Age International Publishers Limited, 3rd Edition, 2015.
2. N.G.Hingorani and L.Guygi, **"Understanding FACTS: Concepts and Technology of**

Flexible AC Transmission Systems", John Wiley & Sons, Inc., Reprint, 2012.

3. HVDC Transmission, S. Kamakshaiah, V. Kamaraju, The Mc — Graw Hill Companies.

References

1. Jos Arrillaga, **"HVDC Transmission"** , The Institution of Electrical Engineers, 2nd Edition, 1998.
2. S.Rao**, "EHVAC and HVDC Transmission Engineering and Practice: Theory, Practice and Solved Problems",** Khanna Publishers, 1990.
3. E.W.Kimbark,**"Direct Current Transmission"**, John Wiley & Sons, Inc., 1971.
4. E.Uhlmann, **"Power Transmission by Direct Current"**, Springer, 1st Edition, 2012.
5. Yong Hua Song and Allan T Johns, **"Flexible AC Transmission Systems(FACTS)",** The Institution of Electrical Engineers, 1999.

E- Resources

1. https://www.electrical4u.com/facts-on-facts-theory-and-applications/
2. https://www.electrical4u.com/high-voltage-direct-current-transmission/
3. http://nptel.ac.in/courses/108104013/

Course Outcomes

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

1. Understand the applications and different types of HVDC links.
2. Analyze the converter configuration & their characteristics.
3. Describe the reactive power requirements in steady state & modeling of DC links.
4. Analyze the power flow in AC system & apply FACTS controllers for dynamic stability.
5. Describe the working principle of static series compensators.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VII Semester		
Code: D0241	**ELECTRICAL ENERGY CONSERVATION AND AUDITING** (Professional Elective-IV)	**L**	**T**	**P**
Credits:3		**3**	**-**	**-**

Prerequisites: Nil

Course Objectives:

This course deals about the concept of energy conservation, energy management and different approaches of energy conservation in industries, economic aspects of energy conservation project and energy audit in commercial and industrial sector.

MODULE I Basic Principles of Energy Audit 9 Periods

Energy audit - definitions, concept , types of audit, energy index, cost index , pie charts, Sankey diagrams, load profiles, Energy conservation schemes - Energy audit of industries - Energy saving potential, energy audit of process industry, thermal power station, building energy audit.

MODULE II Energy Management 9 Periods

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting, Energy manger, Qualities and functions, language, Questionnaire - check list for top management.

MODULE III Energy Efficient Motors 10 Periods

A: Energy efficient motors, factors affecting efficiency, loss distribution, constructional details.

B: Characteristics - Variable speed, variable duty cycle systems, RMS hp - Voltage variation - Voltage unbalance - Over motoring - Motor energy audit.

MODULE IV Power Factor Improvement, Lighting & Energy Instruments 10 Periods

Power Factor Improvement, Lighting: Power factor – Methods of improvement, location of capacitors, Pf with non-linear loads, effect of harmonics on power factor. Power factor motor controllers - Good lighting system design and practice, lighting control, lighting energy audit.

Energy Instruments: Watt meter, data loggers, thermocouples, pyrometers, lux meters, tongue testers , application of PLC's.

MODULE V Economic Aspects and Analysis 10 Periods

Economics Analysis - Depreciation Methods, time value of money, rate of return, present worth method , replacement analysis, life cycle costing analysis - Energy efficient motors, Calculation of simple payback method, net present worth method - Power factor correction, lighting – Applications of life cycle costing analysis, return on investment.

Text Books

1. W.R. Murphy and G. Mckay, **"Energy Management",** Butter Worth Publications.
2. John. C. Andreas, **"Energy Efficient Electric Motors",** Marcel Dekker Inc Ltd, 2nd Edition, 1995.

References

1. Paul O' Callaghan, **"Energy Management",** Mc-Graw Hill Book Company, 1st Edition,1998.
2. W.C.Turner, **"Energy Management Hand Book",** A John Wiley and Sons.
3. S. C. Tripathy, **"Utilization of Electrical Energy"**, Tata McGraw Hill, 1993.
4. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-1, General Aspects (available online).
5. L.C. Witte, P.S. Schmidt and D.R.Brown, **"Industrial Energy Management and Utilization",** Hemisphere Publication, Washington, 1998.
6. De,B. K., "Energy Management audit & Conservation", 2nd Edition, Vrinda Publication,

2010.

E- Resources

1. http://industrialelectricalco.com/wp-content/uploads/2014/01/Understanding-Energy Efficient-Motors-EASA.pdf
2. https://beeindia.gov.in/
3. https://beeindia.gov.in/sites/default/files/3Ch10.pdf

Course Outcomes

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

1. Examine the principles of Energy audit and its process in thermal power station, industries.
2. Analyze the different aspects of energy management.
3. Describe the characteristics of energy efficient motors.
4. Illustrate the power factor improvement, good lighting system practice and the types of energy instruments
5. Analyze the economic aspects of Energy Management.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VII Semester		
Code: D0242	POWER SYSTEM RELIABILITY (Professional Elective– IV)	L	T	P
Credits:3		3	-	-

Prerequisites: Power System-I, Power System-II, Power System Analysis

Course Objectives:

- To describe the generation system model and recursive relation for capacitive model building.
- To explain the equivalent transitional rates, cumulative probability and cumulative frequency.
- To develop the understanding of risk, system and load point reliability indices.
- To explain the basic and performance reliability indices.

MODULE I Definition of Reliability 9 Periods

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.

MODULE II Generating System Reliability Analysis 9 Periods

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**.** 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.

MODULE III Composite Data and Displays 10 Periods

A:Operating Reserve Evaluation: Basic concepts - risk indices – PJM methods – security Function approach – rapid start and hot reserve units – Modeling using STPM approach.

B: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.

MODULE IV Distribution System Reliability Analysis 10 Periods

Basic Techniques – Radial networks –Evaluation of Basic reliability indices, performance indices – load point and system reliability indices – customer oriented, loss and energy-oriented indices – Basic concepts of parallel distribution system reliability.

MODULE V Substations and Switching Stations 10 Periods

Effects of short-circuits - breaker operation – Open and Short circuit 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.

References

1. Reliability Engineering: Theoryand Practice by Alessandro Birolini, Springer Publications.
2. An Introduction to Reliability and Maintainability Engineering by Charles Ebeling, TMHPublications.

E- Resources

1. https://www.youtube.com/watch?v=hoFKwT9nTwE

2. https://www.youtube.com/watch?v=PqhZRRvq0pk
3. https://www.youtube.com/watch?v=W4xlegKqj0g

Course Outcomes

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

1. Analyze the hazard rateand Measures of Reliability.
2. Develop Generating System models and Reliability Analysis.
3. Identify composite data for display and evaluate Power System Reliability for bulk power.
4. Analyze reliability performance indices for Radial and parallel distribution system.
5. Analyze breaker operation failures in Substations and Switching Stations.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VII Semester		
Code: D0243	PLC AND THEIR APPLICATIONS (Professional Elective-VI)	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course Objectives:

To impart knowledge on Mode of operation and programming of a Programmable Logic Controller (PLC), to impart knowledge on Characteristics of a PLC (synchronous, asynchronous), Analysis of the process schematic, analog PLC and PID controllers

MODULE I INTRODUCTION TO PLC 9 Periods

PLC Basics, Block diagram of PLC system, I/O modules, interfacing, PLC-CPU, PLCprocessor, programming equipment, programming formats, construction of PLC ladderdiagrams, devices connected to I/O modules, Applications of PLCs.

MODULE II PLC PROGRAMMING 10 Periods

PLC programming input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation. Digital logical gates programming in the Boolean algebra SYSTEM, CONVERSION EXAMPLES-Ladder diagrams for process control – Ladder diagrams for sequence listings – ladder diagram construction and flow chart for spray process system.Programming based on basic instructions, timer, counter, and comparison instructions using ladder program.

MODULE III REGISTERS AND COUNTERS 10 Periods

A: PLC Registers: Characteristics of registers – module addressing – holding registers – output registers – PLC functions – Timer functions and industrial application.

B: counters – counter function industrial application – Arithmetic functions – number function comparison functions.- number conversion functions.

MODULE IV DATA HANDLING FUCNTIONS AND SEQUENCE FUCNTIONS 10 Periods

Data handling functions: SKIP, Master control relay – Jump Move FIFO, FAL, ONS, CLR and sweep functions and their applications.

Bit pattern and changing a bit shift register, sequence functions and applications – controlling of two axes and three axis Robots with PLC, Matrix functions.

MODULE V ANALOG PLC 9 Periods

Analog PLC operation: Analog modules and systems – Analog signal processing, multi-bit data processing, analog output application examples, PID principles, position indicator with PID control, PID modules, PID tuning, PID functions.

Text Books

1. W. Bolton, "Programmable Logic Controllers" , 5thEdition, Elsevier, 2009.
2. J R Hackworth and F D Hackworth Jr, "Programmable Logic Controllers – Programming methods and Applications" 5thEdition,Pearson Publications, 2004.
3. Module on PLCs and their Applications by Rajesh Kumar, NITTTR Chandigarh

References

1. John W Webb and Ronald A Reiss, "Programmable Logic Controllers – Principles and Applications", 5thEdition, Prentice Hall of India, 1998.
2. Rajesh Mehra and Vikrant Vij, "PLCs & SCADA: Theory and Practice", 1st Edition, Laxm i Publications, 2016.

E- Resources

1. https://www.amci.com/industrial-automation-resources/plc-automation-tutorials /what-plc/
2. http://library.automationdirect.com/understanding-ladder-logic/

Course Outcomes

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

1. Understand the basic concepts of PLC and construct the PLC ladder diagrams.
2. Programming the PLC and Analyze the process schematic.
3. Understand the characteristics of PLC registers and Architecture functions.
4. Analyze the data handling functions and sequence functions.
5. Understand the Analog PLC operation & analog signal processing.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VII Semester		
Code:	OPEN ELECTIVE - II	L	T	P
Credits:3		3	-	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VII Semester		
Code: D0462	MICROPROCESSORS AND MICROCONTROLLERS LAB	L	T	P
Credits:1		-	-	2

Course Objectives:

To introduce programming skills related to microcontrollers.

List of Experiments

1. Arithmetic operations of 8-bit numbers using 8085.
2. Logical operations of 8-bit numbers using 8085.
   a) Binary to BCD code conversions
3. BCD to Binary code conversions using 8085.
4. Arithmetic logical operations of 16 bit numbers using 8086
5. Programming using arithmetic, logical and bit manipulation instructions of 8051.
6. Program to toggle all the bits of Port P1 of 8051 continuously with 250 ms delay.
7. Program to interface seven segment display unit using 8051
8. Program to transmit/receive a message from Microcontroller to PC serially using RS232 using 8051
9. Program to interface Stepper Motor to rotate the motor in clockwise and anticlockwise directions using 8051
10. Program to interface a relay using 8051.
11. Program to interface LCD data pins to port P1 of 8051 and display a message on it.
12. Program for Traffic Light Controller using 8051

Course Outcomes:

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

1. Understand the 8085 processor instructions
2. Develop 8085 programming skills
3. Able to understand 8086 processor instructions
4. Interface different input &output devices to Microcontroller
5. Establish serial communication for interfacing devices

CO-PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	-	3	3	-	-
CO2	3	3	3	3	-	-	-	-	3	-	-	3	3	-	-
CO3	3	3	3	3	-	-	-	-	3	-	-	3	3	-	-
CO4	3	3	3	3	-	-	-	-	3	-	-	3	3	-	-
CO5	3	3	3	3	-	-	-	-	3	-	-	3	3	-	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. VII Semester		
Code: D0223	POWER SYSTEMS LAB	L	T	P
Credits: 1		-	-	2

Course Objectives: To provide better understanding of power system analysis using simulation and to recognize and analyze the operation of power system protection.

List of Experiments:

1. Computation of Parameters and Modeling of Transmission Lines.
2. Formation of Bus Admittance and Impedance Matrices.
3. Load Flow Analysis using Gauss-Seidel Method
4. Short Circuit Analysis for Single Line to Ground fault (L-G).
5. Short Circuit Analysis for Line to Line fault (L-L).
6. Short Circuit Analysis for Double Line to Ground fault (L-L-G).
7. Characteristics of Over Current Relays.
8. Characteristics of Percentage Biased Differential Relay.
9. Performance and Testing of Transformer Protection System.
10. Performance and Testing of Transmission Line Model.
11. Characteristics of Over Voltage Relay.
12. Characteristics of Under Voltage Relay.

Course Outcomes

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

1. Simulate and analyze the load flow of power system network.
2. Simulate and analyze the faults of power system network.
3. Emphasis the performance of transformer.
4. Emphasis the performance of transmission line model.
5. Analyze the performance of power system protection devices

CO-PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	ProgrammeOutcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3					3			2	2		
CO2	3	3	3	3					3			2	2		
CO3	3	3	3	3					3			2	2		
CO4	3	3	3	3					3			2	2		
CO5	3	3	3	3					3			2	2		

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: D00P2	PROJECT STAGE-I	L	T	P
Credits: 3		-	-	6

Course Objectives: To utilize science and engineering to make product/process using innovative techniques, predict the results and prepare technical documents.

Course Outcomes:

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

1. Identify project goals, constraints, deliverables, performance criteria, control needs and requirements.
2. Implement concepts, tools and techniques to do quality projects.
3. Adapt projects in response to issues that arise internally and externally.
4. Interact with team and stakeholders in a professional manner, respecting differences, to ensure a collaborative project environment.
5. Utilize technology tools for communication, collaboration, information management, and decision support.

CO-PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	ProgrammeOutcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	-	-	-	-	-	-	-	-	-	3	3
CO2	3	3	3	2	-	-	-	-	-	-	-	-	-	3	3
CO3	3	3	3	2	-	-	-	-	-	-	-	-	-	3	3
CO4	3	3	3	2	-	-	-	-	-	-	-	-	-	3	3
CO5	3	3	3	2	-	-	-	-	-	-	-	-	-	3	3

SEMESTER-VIII

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: D0244	**ELECTRICAL POWER QUALITY** (Professional Elective- V)	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: Power System Analysis and Control, Power Electronics

Course Objectives: This subject deals with power quality issues and solutions. It also discussed some of the power quality issues like interruptions and voltage sag with their reliability evaluation.

MODULE I Introduction to Power Quality **10 Periods**

Terms and definitions & Sources – Overloading, under voltage, over voltage - Concepts of transients - Short duration variations such as interruption - Long duration variation such as sustained interruption - Sags and swells - Voltage sag - Voltage swell - Voltage imbalance – Voltage fluctuations - Power frequency variations - International standards of power quality – Computer Business Equipment Manufacturers Associations (CBEMA) curve

MODULE II Voltage Sag and Interruptions **10 Periods**

Sources of sags and interruptions -Estimating voltage sag performance - Thevenin's equivalent source - Analysis andcalculation of various faulted condition - Estimation of the sag severity - Mitigation ofvoltage sag, Static transfer switches and fast transfer switches. Interruptions-definition-difference between failure, outage, interruptions-causes of long interruptions origin of interruptions- costs of interruption

MODULE III Over Voltages **9 Periods**

Sources of over voltages - Capacitor switching – lightning - ferro resonance. Mitigation of voltage swells - surge arresters - low pass filters - power conditioners. Lightning protection – shielding – line arresters - protection of transformers and cables.

MODULE IV Harmonics **10 Periods**

Harmonic sources from commercial and industrial loads - Locating harmonic sources –Power system response characteristics - Harmonics Vs transients. Effect of harmonics –Harmonic distortion - Voltage and current distortions - Harmonic indices - Inter harmonics –devices for controlling harmonic distortion - passive and active filters-Harmonic distortion evaluation, IEEE and IEC standards.

MODULE V Power Quality Monitoring **9 Periods**

Monitoring considerations - Monitoring and diagnostic techniques for various power quality problems - Quality measurement equipment - Harmonic / spectrum analyzer – Flicker meters Disturbance analyzer - Applications of expert systems for power quality monitoring.

Text Books

1. Roger. C. Dugan, Mark. F. McGranagham, Surya Santoso, H.Wayne Beaty, **"Electrical Power Systems Quality"**, McGraw Hill, 2003.
2. J. Arrillaga, N.R. Watson, S. Chen, "Power System Quality Assessment", (New York :Wiley),2000.
3. Bhim Singh, Ambrish Chandra, Kamal Al-Haddad," Power Quality Problems & Mitigation Techniques" Wiley, 2015.

References

1. G.T. Heydt, "Electric Power Quality", 2nd Edition. (West Lafayette, IN, Stars in a Circle Publications, 1994.
2. M.H.J Bollen, "Understanding Power Quality Problems: Voltage Sags and Interruptions", (New York: IEEE Press), 2000.

3. C. Sankaran, **"Power Quality"**, CRC press, Taylor & Francis group, 2002.
4. Ewald F. Fuchs, Mohammad A. S. Masoum, **"Power Quality in Power Systems and Electrical Machines"**, Academic Press, 2nd Edition, 2011.
5. Angelo Baggiri, **"Handbook of Power Quality"**, John Wiley & Sons, 1st Edition, 2008.
6. Francisco C. De La Rosa, **"Harmonics and Power Systems"**, CRC Press, 1st Edition, 2006.
7. R.S.Vedam, M.S.Sarma, **"Power Quality – VAR Compensation in Power Systems"**, CRC Press, 2013.

E - Resources

1. http://www.elec.uow.edu.au/apqrc/links
2. http://technav.ieee.org/tag/1354/power-quality#concepts
3. http://nptel.ac.in/courses/108106025/

Course Outcomes

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

CO1	***Explain*** the basic terms, definitions, and sources of power quality issues, including overloading, under-voltage, and over-voltage.	Understand	L2
CO2	***Analyze*** the Causes of voltage sag and its characteristics for single phase and three phase system.	Analyze	L4
CO3	***Assess*** the impact of overvoltages on electrical equipment and recommend appropriate mitigation techniques based on system requirements.	Evaluate	L5
CO4	***Describe*** the effects of harmonics on power systems, including voltage and current distortions, and ***Utilize*** passive and active filters to control harmonic distortion in electrical systems.	Apply	L3
CO5	***Explain*** the functionality of quality measurement equipment such as harmonic analyzers, flicker meters, and disturbance analyzers.	Understand	L2

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2	3	1	3	-	-	-	-	1	3	3	-
CO2	3	3	3	3	3	1	3	-	-	-	-	-	3	2	-
CO3	3	2	1	3	3	-	3	-	-	-	1	-	3	3	-
CO4	3	3	3	3	3	-	3	1	-	-	1	-	3	3	-
CO5	3	3	3	3	3	-	3	1	-	-	1	-	3	3	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: D0245	SPECIAL MACHINES (Professional Elective – V)	L	T	P
Credits: 3		3	-	-

Prerequisites: DC Machines and Transformers, AC Machines.

Course Objectives: The course deals with the special electrical machines such as induction generator, brushless DC machines, stepper motors which are used in different applications.

MODULE I Induction Generators 10 Periods

Self excitation requirements, steady state analysis, voltage regulation, different methods of voltage control. Doubly fed induction machines: control via static converter, power flow, voltage/frequency control (generation mode), application to grid connected wind and mini/micro hydel systems.

MODULE II Brushless DC Machines 9 Periods

Brushless DC Machines: Construction, operation, performance, control and applications. Micro Machines: Principle of operation of various types. Sensors for control, e.g. Position sensor.

MODULE III Linear Machines 10 Periods

A: Linear Induction Machines and Linear Synchronous Machines. Construction, operation, performance, control and applications.

B: PMDC and PM Synchronous Machine, control and applications. Recent developments in electrical machines.

MODULE IV Stepper Motors 10 Periods

Various types, principle of operation, operating characteristics, applications. Servo Motors, Servo amplifier and control. Special types of permanent magnet motors for servo application. Switched Reluctance Motor: Construction, operation, performance, control and applications.

MODULE V Synchronous and Special Machines 9 Periods

Construction of synchronous machines - Types - Induced emf - Voltage regulation - EMF and MMF methods. Brushless alternators - Reluctance motor - Hysteresis motor – Axial flux machine – Construction and working principle. Flux Reversal Machine – Construction and working principle - Applications.

Text Books

1. P.C. Sen, "**Principles of Electrical Machines and Power Electronics"**, Wisley Edition, 2nd Edition, 1997.
2. Gopal K Dubey, **"Fundamentals of Electrical Drives",**Narosa Publications, 2nd Edition, 2008.

References

1. Bimal K. Bose, **"Modern Power Electronics and AC Drives"**, Low Price Edition, 1st Edition, 2002.
2. R.K. Rajput, **"Electrical Machines"**, Laxmi Publications Pvt., Ltd, 5th Edition, 2005.
3. E.G. Janardanan, **"Special Electrical Machines"**, PHI Learning Pvt. Ltd., 2014.
4. K.Venkataratnam, **"Special Electrical Machines",** Universities Press, 1st Edition, 2008.
5. Simmi P. Burman, **"Special Electrical Machines"**, S.K. Kataria& Sons, 2013.

E - Resources

1. http://nptel.ac.in/courses/108105063/pdf/L-32(SS)(IAC)%20((EE)NPTEL).pdf
2. https://www.eeweb.com/electromechanical
3. https://www.youtube.com/watch?v=Qy6mA4TEpyI

Course Outcomes

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

1. Understand the operation of induction generator.
2. Know the Construction and operating principle of Brushless DC motor and sensor used to control the speed of the motors.
3. Understands the Principle of operation of Linear Induction and Synchronous machines.
4. Comprehend the principle of operation of stepper motors, Permanent magnet motors and switched reluctance motors.
5. Understands the construction, operation and application of brushless alternators, reluctance motors, hysteresis motors and axial flux machines.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	-

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: D0246	SUPERVISORY CONTROL AND DATA ACQUISITION (Professional Elective-V)	L	T	P
Credits: 3		3	-	-

Prerequisites: Power Generation and Distribution, Power System Analysis and Control and Digital Electronics.

Course Objectives: To develop architecture of SCADA to explain each unit in detail. To apply knowledge gained about SCADA systems to identify few real-life industrial applications.

MODULE I Introduction to SCADA 10 Periods

Need of SCADA system, Distributed control Systems (DCS), General definition and SCADA components. Hardware architecture, software architecture, protocol detail, discrete control and analog control, application & benefits, PLCs Vs RTUs.

MODULE II Remote Terminal Units (RTU) 10 Periods

General features, Functions and Applications, Benefits, Configurations of SCADA, RTU (Remote Terminal Units) connections. RTU Block diagram, MTU communication interface, Future trends, Internet based SCADA display system, Components of control systems in SCADA.

MODULE III SCADA in Power Systems 9 Periods

A: Main task in power systems- Planning, operation, accounting, tasks of national control centre, regional control centre, Generating station control room, AGC-SCADA,

B:SCADA in generation, SCADA in Power Distribution, SCADA in Power Grid.

MODULE IV Supervisory Power Management 10 Periods

Energy Management System, power system operation states, security analysis, computer programmes-generating planning, transmission planning, system studies, energy audit, state estimation, load forecasting.

Utility distribution system design, regulation, distribution automation, DMS, design, layout and construction and commissioning of substations, Substation Automation and Equipment condition monitoring

MODULE V Automatic mapping and facility management 9 Periods

Introduction to Automatic mapping and facility management, Distribution system design, Facility mapping, tracking, facility inventory, system and equipment maintenance, trouble call management, Customer level intelligent automation system, computer level monitoring and control of distribution transformers, Substation and feeder level automation.

Text Books

1. Stuart A. Boyer ,**"SCADA"** , IAS 1999.
2. J. Parikh, B. Reddy & R. Benerjee**"Planning for demand side management in Theelectric sector",** TMH**.**
3. Terson ,**"Power system Control Technology"** , Prentice Hall New Delhi

References

1. Elliot L. Gruenberg, **"Hand book of Telemetry of Remote control"** , MGH New Delhi
2. Roddy & Coolen, **"Electronics Communication"**
3. S.S. Rao, **" Switch Gear & Protection"** , Khanna Publication, New Delhi
4. S.L. Uppal, **"Electric Power system"**
5. S K Gupta, **"Power System Engineering"** , Umesh Publication

E - Resources

1. http://nptel.ac.in/courses/108106022/8
2. http://v5.books.elsevier.com/bookscat/samples/9780750669498/9780750669498.DF

Course Outcomes

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

1. Know Need of SCADA, discrete and analog control, basic architecture of SCADA.
2. Understand the Basic concepts of Remote terminal units.
3. Comprehend the application of SCADA in generator control room, in power distribution and in power grid.
4. Estimate the power system operation states, energy audit discussion and substation automation and condition monitoring.
5. Analyze Intelligent automation control, equipment maintenance and feeder level automation for power system applications.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2
CO2	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2
CO3	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2
CO4	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2
CO5	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VIII Semester		
Code: D0247	INDUSTRIAL ELECTRICAL SYSTEMS (Professional Elective– V)	L	T	P
Credits:3		3	-	-

Prerequisites: Utilization of Electric Energy

Course Objectives: This course deals with the new concepts invarious electrical system components,residential and commercial electrical systems, illumination systems and industrial electrical systems

MODULE I Electrical System Components 9 Periods

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

MODULE II Residential and Commercial Electrical Systems 9 Periods

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

MODULE III Illumination Systems 10Periods

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

MODULE IV Industrial Electrical Systems – I 10 Periods

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

MODULE V Industrial Electrical Systems – II 10 Periods

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

Text Books

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

References

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

E- Resources

1. safetyrisk.net/15-safety-precautions-when-working-with-electricity/
2. https://www.homequestionsanswered.com/what-is-flood-lighting.htm
3. https://lightning.org/lightning-protection-overview

Course Outcomes

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

1. Understand various components of industrial electrical systems and representing the systems with standard symbols
2. Understand electric shock and electrical safety practices
3. Applying electrical wiring systems for residential, commercial and industrial consumers
4. Analyze various illumination systems
5. Evaluate various electrical industrial systems.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VIII Semester		
Code: D0248	**Wearable Electronics** (Professional Elective– V)	L	T	P
Credits:3		3	-	-

Prerequisites: Linear and Digital IC Applications

Course Objectives: This course deals with the various wearable systems,smart sensors and vital parameters,wearablecomputers,wireless body area networks and electronic textiles

MODULE I INTRODUCTION 9 Periods

Drawbacks of Conventional Systems for Wearable Monitoring, Applications of Wearable Systems, Recent developments – Global and Indian Scenario, Types of Wearable Systems, Components of wearable Systems, Physiological Parameters commonly monitored in wearable applications, Smart textiles, & textiles sensors, Wearable Systems for Disaster management, Home Health care, Astronauts, Soldiers in battle field, athletes, SIDS, Sleep Apnea Monitoring

MODULE II SMART SENSORS AND VITAL PARAMETERS 9 Periods

Vital parameters monitored and their significance, Bio-potential signal recordings (ECG, EEG, EMG), Dry Electrodes design and fabrication methods, Smart Sensors – textile electrodes, polymer electrodes, non-contact electrodes, MEMS and Nano Electrode Arrays, Cuff-less Blood Pressure Measurement, PPG, Galvanic Skin Response (GSR), Body Temperature Measurements, Activity Monitoring for Energy Expenditure, Respiratory parameters.

MODULE III WEARABLE COMPUTERS 10Periods

Flexible Electronics, Signal Processors, Signal Conditioning circuits design, Power Requirements, Wearable Systems Packaging, Batteries and charging, Wireless Communication Technologies and Protocols, Receiver Systems, Mobile Applications based devices. Data processing and validation – Signal Processing Algorithms in wearable Applications

MODULE IV WIRELESS BODY AREA NETWORKS 10 Periods

Wireless Body Area Networks – Introduction, Personal Area Networks (PAN), Application in Vital Physiological Parameter monitoring, Design of Sensor & Sink Nodes, Architecture, Communication &Routing Protocols, Security, Power and Energy Harvesting.

MODULE V ELECTRONIC TEXTILES 10 Periods

Concepts and development of electronic textile. Conductive Polymers and Fibers - Textile Fibres Used for Wearable Electronic Applications. Interfacing Circuits and Garments - Designing of Wearable fabrics integrated with Electronic materials and circuits. Design of Heat-Generating Circuit for Nichrome Fabric, Design of Communication Circuit for Copper Core Conductive Fabric. Design of Signal-Transferring Circuit form Optical Core Conductive Fabric. Design of Bullet Wound Intimation Circuit for Tele-intimation Fabric.

Text Books

1. Micheal R Neuman, Edward Sazonov, "Wearable Sensors: Fundamentals, Implementation and Applications",1st Edition, Elseiver, USA, 2014
2. Xiao ming Tao, "Wearable Electronics and Photonics", 1st Edition, CRC press, Manchester, 2005.

References

1. Kate Hartman, "Wearable Electronics: Design, Prototype and wear your own interactive garments, Maker Media", 1 st Edition, Maker Media, Inc, USA, 2014.
2. Elijah Hunter, "Wearable Technology", 1st Edition, Kindle Edition, USA, 2015.
3. Guang Zhong Yang, "Body Sensor Networks", 1st Edition, Springer, UK, 2014.
4. Xiaoming Tao, "Wearable Electronics and Photonic Wearable Electronics and Photonics, The Textile Institutes",1st Edition, CRC Press, Manchester, 2005.

E- Resources

1. https://www.vtec-ls.nl/solutions/components
2. https://www.energy.gov/sites/prod/files
3. https://www.technicaltextile.net/articles/electrotextiles-concepts

Course Outcomes

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

1. Understandvarious wearable systems
2. Understand smart sensors and bio-potential signal recordings
3. Evaluatewearable computers and signal processing algorithms in wearable applications
4. Apply wireless body area networks and power& energy harvesting.
5. Analyze concepts and development of electronic textile

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	-	3

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: D0249	WIND AND SOLAR ENERGY SYSTEMS (Professional Elective –VI)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives: Renewable energy is clean, affordable, domestic, and effectively infinite. It produces no emissions and results in cleaner air and water for all.This Course discusses prefeasibility analysis, optimum sizing, modeling, control aspects and reliability issues.

MODULE I Constant Speed Wind Power Plants 10 Periods

Type-A WPP(Wind Power Plants): Working Principle , Different topologies, Starting methods and Maintenance procedure.

Type-B WPP: Working Principle, Different Types, Maintenance procedure. Compare the major differences in the maintenance of Type-A and Type-B WPPs.

MODULE II Variable Speed Wind Power Plants 10 Periods

Type-C WPP:Working principle, Working Principle Back- to-Back control and Maintenance procedure of Type-C WPPs.

Type-D Geared WPP:Working principle, Maintenance procedure of Type-D Geared WPPs Type-D direct-drive WPP:Working principle, Maintenance procedure of Type-D Geared WPPs.Need for direct drive WPPs.

MODULE III Solar Power Plant Performance 10 Periods

A: Solar Thermal Power Plants: Working of a typical Concentrated Solar Power (CSP) plant, Maintenance procedure of CSP systems

B: Solar photovoltaic (PV) Power Plants: Working of a typical Solar PV Power plant. Types of Batteries for solar PV system. Maintenance procedure of typical Solar PV Power plant.

MODULE IV Wind and Solar Power Quality 9 Periods

Local impact of wind power on the grid. System wide impact of wind power on the grid. Power Quality of solar PV systems Power quality of CSP solar plant. Power quality of solar PV power plant .

MODULE V Grid Connection of Wind and Solar Power Plants 9 Periods

Grid interface issues of wind power. Grid operational issues of wind power. Grid connection of CSP plants. Grid connection of solar PV power plants Wind- solar hybrid systems. Maintenance of solar PV and wind solar Hybrid system

Text Books

1. Earnest , Joshua , **"Wind Power Technology"** PHI Learning, New Delhi, 2014
2. Solanki, Chetan Singh, **"Solar Photovoltaic: Fundamentals, Technologies and Application"** PHI Learning, New Delhi, 2009
3. S.P. Sukhatme, J.K.Nayak**"Solar Energy "** Tata McGraw, New Delhi, 2010.

References

1. Solanki, Chetan Singh, Arora, Brij M., VasiJuzer, Patil, Mahesh B. "**Solar Photovoltaic: A Lab TrainingModule"** Cambridge University Press, New Delhi, 2009.

E - Resources

1. http://www.awea.org/Resources/Content.aspx?ItemNumber=900

2. http://www.windpowerwiki.dk/
3. http://www.fao.org/docrep/010/ah810e/AH810E11.htm
4. http://www.renewables-made-in-germany.com/en/renewables-made-in-germany-start/solar-energy/solar-thermal-energy/overview.html
5. http://www.renewables-made-in-germany.com/en/renewables-made-in-germany-start/solar-energy/solar-thermal-power-plants/overview.html
6. 4. http://www.eai.in/ref/ae/sol/technology_options.html

COURSE OUTCOMES:

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

1. Comprehend constant speed wind power plants.
2. Compare the operation of variable speed wind power plants.
3. Analyze the operation of concentrated solar power (CSP) and solar photovoltaic (PV) power plants
4. Analyze the grid compatibility of the power from wind and solar power plants.
5. Resolve the grid integration issues of wind and solar power plants

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	ProgrammeOutcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	3	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	3	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	3	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	3	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	3	-

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VIII Semester		
Code:D0250	ELECTRIC SMART GRID (Professional Elective-VI)	L	T	P
Credits:3		3	-	-

Prerequisites: Power System Analysis and Control.

Course Objectives:

This course is introduced to provide an overview of the smart grid and to understand the various aspects of the smart grid, including Technologies, Components, Architectures and Applications.

MODULE I Introduction to Smart Grid 10 Periods

Review Basic Elements of Electrical Power Systems: The Origins of the Power Grid - How the Grid Grew - A Primer on Today's Electrical Utilities - Desirable Traits of a Modern Grid – Principal Characteristics of the Smart Grid - Government and Industry Standardization – Standards and Electricity Markets.

MODULE II Smart Grid Communications 10 Periods

Two - way Digital Communications Paradigm, Network Architectures, IP-based Systems, Power Line Communications, Advanced Metering Infrastructure. **Measurements:** Sensor Networks, Phasor Measurement Units, Communications Infrastructure, Fault Detection and Self-Healing Systems, Applications and Challenges.

MODULE III Distribution System Management 9 Periods

A: Data sources and associated external systems, Modeling and analysis tools, applications.
B: Demand Response: Definition, Applications, and State-of-the Art, Pricing and Energy Consumption, Scheduling, Controllable Load Models, Dynamics, and Challenges, Electric Vehicles and Vehicle-to-Grid Systems, Demand Side Ancillary Services.

MODULE IV Economics and Market Operations 9 Periods

Energy and reserve markets, market power, generation firms, locational marginal prices, financial transmission rights.

MODULE V Security and Privacy 9 Periods

Cyber Security Challenges in Smart Grid, Load Altering Attacks, False Data Injection Attacks, Defense Mechanisms, Privacy Challenges.

Text Books

1. James Momoh, **"Smart Grid Fundamentals of Design and Analysis"**, IEEEPress, 2012.
2. Janaka Ekanayake, Kithsiri Liyanage,Jianzhong Wu, Akihiko Yokoyama and Nick Jenkins, **"Smart Grid Technology and Applications"**, IEEE Press, 2012.

References

1. AranyaChakraborthy and Marija D llic, **"Control and Optimization Methods for Electric Smart Grids"**, Editor, Springer Publications.
2. Lars T. Berger, Krzysztof Iniewski, **"Smart Grid applications, Communications and Security"**, John Wiley Publishers Ltd., 2012.
3. Yang Xiao, **"Communication and Networking in Smart Grids"**, CRC Press, Taylor and Francis Group, 2012.
4. Caitlin G. Elsworth, **"The Smart Grid and Electric Power Transmission"**, Nova Science Publishers, 2010.
5. Krzysztof Iniewski**, "Smart Grid Infrastructure & Networking",** McGraw Hill Education, 2012.

E- Resources

1. http://www.ee.ucr.edu/~hamed/Smart_Grid_Topic_2_Smart_Grid.pdf
2. http://www.ee.ucr.edu/~hamed/Smart_Grid_Topic_3_Communications.pdf
3. https://www.eeweb.com/power-management

Course Outcomes

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

1. Describe the characteristics of smart grid.
2. Describe the concepts & principles of communications technologies for smart grid.
3. Analyze the demand response and energy consumption.
4. Analyze the market operations & financial transmission rights.
5. Describe the security challenges in smart grid.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	1	1

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VIII Semester		
Code:D0251	AI APPLICATIONS IN ELECTRICAL ENGINEERING (Professional Elective-VI)	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course Objectives:

To cater the knowledge of soft computing techniques, such as genetic Algorithms, Fuzzy logic and artificial neural networks.

MODULE I Genetic Algorithms **10 Periods**

Introduction – Encoding–Fitness Function – Reproduction operator – Genetic Modeling– Genetic operators – Crossover-Single–site cross over-Two point cross over– Multi point cross over –Uniform cross over–Matrix cross over – Cross over Rate – Inversion & Deletion– Mutation operator – Mutation– Mutation Rate – Bit-wise operators – convergence of Genetic Algorithm.

MODULE II Fuzzy Logic **10 Periods**

Introduction–Fuzzy versus crisp – Fuzzy sets – Membership function – Basic Fuzzy set operations– Properties of Fuzzy sets – Fuzzy Cartesian Product– Operations on Fuzzy relations –Fuzzy Quantifiers –Fuzzy Inference – Fuzzy Rule based system – Defuzzification methods.

MODULE III Artificial Neural Networks **10 Periods**

A: Introduction – Models of Neural Network – Architectures – Knowledge representation – Artificial Intelligence and Neural networks.

B: Learning process–Error correction learning–Hebbian learning–Competitive learning Supervised learning–Unsupervised-learning–Reinforcement learning-learning tasks.

MODULE IV ANN Paradigms **9 Periods**

Multi–layer perceptron using Back propagation Algorithm – Self – organizing Map –Radial Basis Function Network – Functional link, network– Hopfield Network.

MODULE V Applications of AI Techniques **9 Periods**

Load forecasting – Load flow studies – Economic load dispatch – Load frequency control – Single area system and two area system –Reactive power control – speed control of DC and AC Motors.

Text Books

1. S.RajasekaranandG.A.V.Pai,**"Neural Networks, Fuzzy Logic & Genetic Algorithms"**, PHI, New Delhi, 2003.

References

1. P.D.Wasserman, Van Nostrand Reinhold, **"Neural Computing Theory & Practice",** New York,1989.
2. BartKosko, **"Neural Network & Fuzzy System",** PrenticeHall,1992.
3. G.J.KlirandT.A.Folger,**" Fuzzy Sets, Uncertainty and Information",** PHI,Pvt.Ltd,1994.
4. D.E.Goldberg,AddisonWesley, **"Genetic Algorithms",** 1999.

E- Resources

1. https://aitopics.org/
2. ieeexplore.ieee.org/document/10029/
3. www.nptelvideos.in/2012/11/artificial-intelligence-prof-p-dasgupta.html

Course Outcomes

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

1. Apply the genetic modeling,fitness function reproduction operators.
2. Apply the concep to fuzzy based system,analogy between fuzzy and crispsets,basic fuzzyset operations, rule based systems, Defuzzification methods.
3. Recognize artificial neuron models,architectures,learning process,and learning techniques of artificial neuron models.
4. Apply algorithms like backpropagation algorithm,self organizing map, radial networks.
5. Apply the Intelligence techniques to real Power Systems

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1		3	2	1	1	-	-	-	-	-	2	1	1
CO2	3	2	1	2	3	-	-	-	-	-	-	-	1	-	-
CO3	3	2	1	3	2	1	1	-	-	-	-	-	2	1	1
CO4	3	3	2	2	3	-	-	-	-	-	-	-	1	-	-
CO5	3	2	3	3	2	3	1	-	-	-	-	-	3	1	2

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE	B.Tech. VIII Semester		
Code:D0252	NEURAL NETWORKS AND FUZZY LOGIC (Professional Elective-VI)	L	T	P
Credits:3		3	-	-

Prerequisites: Nil

Course Objectives:

This course introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks. Also deals with Associative Memories and introduces Fuzzy sets and Fuzzy Logic system components. The Neural Network and Fuzzy Network system application to Electrical Engineering is also presented.

MODULE I Introduction to Neural Networks **10 Periods**

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate and Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch- Pitts Model, Historical Developments.

Essentials of Artificial Neural Networks:

Model of an Artificial Neuron, Types of Activation Functions, ANN Architectures, Classification Taxonomy of ANN, Connectivity: Vertices, Edges and Digraph, Learning Methods (Supervised, Unsupervised, Reinforced), Learning Rules, Types of Application

MODULE II Single Layer Feed Forward Neural Networks **10 Periods**

Introduction, Perceptron Models: Simple Perceptron Model and Multilayer feed forward perceptron model, Training Algorithms, Limitations of the Perceptron Model, Applications.

Multilayer Feed Forward Neural Networks:

Credit Assignment Problem, Generalized Delta Rule, and Back propagation (BP) Training algorithm.

MODULE III Associative Memories **10 Periods**

A: Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory(Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory).

B:Bidirectional Associative Memory (BAM):

Architecture, BAM Training Algorithms: Storage and Recall Algorithm. Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network.

MODULE IV Classical& Fuzzy Sets **9 Periods**

Introduction to classical set theory - Operations on Crisp sets, Properties of Crisp sets and Crisp Relations. Fuzzy sets, Uncertainty, Membership function, Properties, Fuzzy relations.

MODULE V Fuzzy Logic System Components and Fuzzy Logic Applications **9 Periods**

Fuzzy logic, Fuzzy Quantifiers, Fuzzy Inference, Fuzzification, Fuzzy rule based system, Defuzzification, Defuzzification methods, Fuzzy logic applications.

Text Books

1. Bart Kosko, **"Neural Networks and Fuzzy Logic System"**, Prentice Hall of India, 1991.
2. S.Rajasekaran and G.A.V.Pai, **"Neural Networks, Fuzzy Logic & Genetic Algorithms"**, Prentice Hall of India, New Delhi, 2003.

References

1. James A Freeman and Davis Skapura, **"Neural Networks"**, Pearson Education, 2002.

2. Simon Haykin, **"Neural Networks and Learning Machines"**, Pearson Education, 3rd Edition, 2009.
3. C.Eliasmith and CH.Anderson, **"Neural Engineering"** 1st Edition, Prentice Hall of India, 2009.
4. Jacek M. Zurada, **"Introduction to Artificial Neural Systems"**, 1st Edition, Jaico Publishing House, 2006.
5. Rober J. Schalkoff, **"Artificial Neural Networks"**, Tata McGraw Hill Edition, 2011.

E- Resources

1. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_neural_networks.htm
2. http://uni-obuda.hu/users/fuller.robert/nfs.html
3. http://nptel.ac.in/courses/108104049/

Course Outcomes

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

1. Comprehend the concept of neural networks.
2. Analyze various feed forward networks.
3. Understand the importance of Associative memories.
4. Comprehend classical, fuzzy set theories and the components of fuzzy logic systems.
5. Analyze the application of fuzzy logic control to real time systems.

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2
CO2	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2
CO3	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2
CO4	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2
CO5	3	3	3	3	3	-	-	-	-	-	-	3	3	-	2

2024-25 Onwards (MR-24)	MALLAREDDY ENGINEERINGCOLLEGE (Autonomous)	B.Tech. VIII Semester		
Code:D0253	AUTOMOTIVE ELECTRICAL AND ELECTRONICS SYSTEMS (Professional Elective– VI)	L	T	P
Credits:3		3	-	-

Prerequisites: Control systems and Instrumentation

Course Objectives:

This course deals with the Current trends in modern automobiles,basic electrical components in an automobile,embedded systems in typical modern automobile,electronics control units and automotive networking protocols.

MODULE I INTRODUCTION **9 Periods**

Current trends in modern automobiles – – Drive by wire Systems -Vehicle functional domains and their requirements - Components of an Automobile Electronic system and their functions: Sensors, Actuators, Control Units and Software structure of Control units.

MODULE II AUTOMOBILE ELECTRICALS AND ELECTRONICS **9 Periods**

Basic Electrical Components in an automobile - Starting system (Battery, Ignition Switch, Solenoid, Starter, Neutral Safety Switch), Charging system (Alternator Drive Belt, Alternator, Voltage Regulator), Fuses. Overview of Vehicle Electronic system - Driver - Vehicle - Environment system (Control and monitoring systems, Electronic systems of the vehicle and the environment) -General instrumentation block diagram - Typical instrumentation cluster lay out.

MODULE III EMBEDDED SYSTEM IN AUTOMOTIVE CONTEXT **10 Periods**

Embedded systems in typical modern automobile - Distributed systems, Embedded components - -Engine Management system - Diesel / Gasoline system, Components, System architecture(H/W, S/W) - Body electronics systems, - Infotainment systems – Navigation, Car radio.

MODULE IV ELECTRONICS CONTROL UNITS (ECUS) **10 Periods**

ECUs and vehicle subsystems - Electronic systems of Power train subsystem, Electronic systems of Chassis subsystem, Electronic systems of Body subsystems (Comfort and Passive safety), Multimedia subsystems. Automobile sensors and actuators, Engine management system, Vehicle safety systems, Environmental legislation (Pollution Norms - Euro / Bharat standards)

MODULE V DIAGNOSTICS AND AUTOMOTIVE NETWORKING PROTOCOLS **10 Periods**

Diagnostics procedure: Introduction – Diagnostics theory – on board and off board diagnostics Diagnostics Link Connector (DLC) - CAN bus topology – Data transmission – CAN protocol – Over view of CAN controller - LIN bus: overview – Data transmission system - LIN protocol.

Text Books

1. Tom Denton, "Automobile Electrical and Electronics systems", Routledge Taylor & Francis Group, London & New York, 2002.
2. Nicolas Navet and Francoise Simonot-Lion, "Automotive Embedded Systems Handbook", CRC Press, USA, 2013.

References

1. Michel Parent &FurnioHarshima, Ljubovlacic, "Intelligent Vehicle Technologies: Theory and Applications", 1st Edition, Butterworth-Heinemann publications, New Delhi, 2001.
2. Ronald k.J, "Automotive Electronics Handbook", 2 nd Edition, McGraw Hill Publications, Columbus, 2009.
3. Norman P. Mansour, William Ribbens, "Understanding of Automotive Electronics", 5th Edition, Butterworth- Heinemann, United Kingdom, 2014.
4. Robert Bosch , "Automotive Electrics Automotive Electronics", 5th Edition, Springer, Germany, 2010

E- Resources

1. www.epicflow.com/blog/5-latest-trends-in-the-automotive-industry/
2. https://www.gcoeara.ac.in/learning_material/auto
3. https://copperhilltech.com/blog/controller-area-network-can-bus

Course Outcomes

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

1. Understand current trends in modern automobiles
2. Understand components of an automobile electronic system
3. Applying embedded systems in typical modern automobile
4. Analyze electronics control units in vehicles
5. Evaluate automotive networking protocols

CO-PO Mapping

CO-PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COS	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	3	-	3	-	2	-	3
CO2	3	3	3	3	-	-	-	-	3	-	3	-	2	-	3
CO3	3	3	3	3	-	-	-	-	3	-	3	-	2	-	3
CO4	3	3	3	3	-	-	-	-	3	-	3	-	2	-	3
CO5	3	3	3	3	-	-	-	-	3	-	3	-	2	-	3

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE	B.Tech. VIII Semester		
Code:	OPEN ELECTIVE-III	L	T	P
Credits: 3		3	-	

2024-25 Onwards (MR-24)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: D00P3	**PROJECT STAGE – II INCLUDING SEMINAR** (Major Project)	**L**	**T**	**P**
Credits: 11		**-**	**-**	**22**

Course Objectives:

- To utilize science and engineering to make product/process using innovative techniques, predict the results and prepare technical documents.
- To promote deeper understanding the basic concepts, physical mechanism behind the processes, participate in scientific analysis and comprehensive of scientific writing of verbal presentation. This course is to introduce post graduate student to ideas, methods and techniques that can improve the content and presentation of scientific seminars.

Course Outcomes:

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

1. Identify project goals, constraints, deliverables, performance criteria, control needs and requirements.
2. Adapt projects in response to issues that arise internally and externally.
3. Interact with team and stakeholders in a professional manner, respecting differences, to ensure a collaborative project environment.
4. Utilize technology tools for communication, collaboration, information management, and decision support.
5. Write technical reports and deliver oral presentation with effective communication

CO-PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COS	ProgrammeOutcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	-	-	-	-	2	-	2	-	-	3	3
CO2	3	3	3	2	-	-	-	-	2	-	2	-	-	3	3
CO3	3	3	3	2	-	-	-	-	2	-	2	-	-	3	3
CO4	3	3	3	2	-	-	-	-	2	-	2	-	-	3	3
CO5	3	3	3	2	-	-	-	-	2	-	2	-	-	3	3