ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABUS

From the Academic Year 2018-19 onwards

Department of Electrical and Electronics Engineering

(EEE)

For

B.Tech. Four Year Degree Programme

(MR18 Regulations)

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
(II Cycle), Maisammaguda, Dhulapally (Post Via Kompally), Secunderabad-500 100
Website: www.mrec.ac.in, E-mail: principal@mrec.ac.in

MALLA REDDY ENGINEERING COLLEGE
(AUTONOMOUS)
MR18 – ACADEMIC REGULATIONS (CBCS)
for B.Tech. (REGULAR) DEGREE PROGRAMME

Applicable for the students of B.Tech. (Regular) programme admitted from the Academic Year ***2018-19*** 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

To establish a reputable professional education centre, to impart high quality trend setting technologies in an ambience of humanity, wisdom, intellect and innovation to nurture the students to become competent and committed professionals with disciplined ethical values.

MISSION

Commitment to progress in mining new knowledge by adopting cutting-edge technologies to promote academic growth by offering state-of-the-art undergraduate and postgraduate programmes based on well-versed perceptions of global areas of specialization to serve the nation with advanced technical knowledge.

DEPARTMENT VISION

To strive and develop a learning centre in the field of electrical engineering and prepare the students to become talented and committed professionals with discipline and sincerity in serving the society.

DEPARTMENT MISSION

To impart quality education with dedication to achieve academic excellence and offer state-of-the-art technology in the field of electrical engineering to enhance the knowledge and employability of the students.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1. To train students in core engineering knowledge with software skills, multi disciplinary approach, and make them capable to understand, analyze, design and control electrical machines, power systems and electronic products with solutions for real life applications.

PEO 2. To provide students an impressive academic environment for a successful career in industry/Technical profession and post graduate programmes, research and lifelong learning.

PEO 3. To instill in students professional and ethical attitude, team work skills, leadership qualities and improve oral and written communication skills.

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.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: To offer optimum solution for electrical engineering problems through advanced technologies like embedded system based technology.

PSO2: To develop new technologies to generate electrical energy through renewable sources for better future.

PSO3: To enhance the technical solutions through LabVIEW to comply with industrial requirements.

1. **Under-Graduate Degree Programme in Engineering & Technology (UGP in E&T): Malla Reddy Engineering College (Autonomous) (MREC-A)** offers **Four** Year (**Eight** Semesters) **Bachelor of Technology** (**B.Tech**.) Under Graduate Programmes, under Choice Based Credit System (CBCS) in the following Branches of Engineering.

S. No.	Branch Code	Branch	Intake
1	01	Civil Engineering (CE)	180
2	02	Electrical and Electronics Engineering (EEE)	60
3	03	Mechanical Engineering (ME)	240
4	04	Electronics and Communication Engineering (ECE)	180
5	05	Computer Science and Engineering (CSE)	240
6	06	Information Technology (IT)	60
7	25	Mining Engineering (Mi.E)	60

2. Eligibility for Admission

2.1 Admission to the UGP 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 the University, 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 UGP in E&T will be ENGLISH only.

3. B.Tech. Programme (UGP) Structure & Duration of Study

3.1 A student after securing admission shall pursue the Under Graduate Programme in B.Tech. 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. Each semester is structured to provide around 20 credits, totaling to 160 credits for the entire B.Tech. programme. Each student shall secure 160 credits (with CGPA $\geq$ 5) required for the completion of the Under Graduate Programme and award of the B.Tech. degree.

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

3.2.1 Semester Scheme:

Each under graduate programme is of 4 academic years (8 Semesters), with the academic year divided into two semesters of 22 weeks ($\geq$90 Instructional days) each, each semester having **'Continuous Internal Evaluation (CIE)'** and **'Semester End Examination (SEE)'** under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and Curriculum/ Course Structure as suggested by AICTE are followed.

3.2.2 Credit Courses:

All Subjects/ Courses are to be registered by 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/ Tutorials (T).
- One Credit - for two hours/ Week/ Semester for Laboratory/ Practical (P) Courses.

Courses like Environmental Sciences, Induction Programme, Gender Sensitization, Indian Constitution, Essence of Indian Traditional Knowledge and other student activities like Internship, Sports/Yoga and NSS 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 under graduate programme in E&T (B.Tech. degree programmes) are broadly classified as follows. The Institute has followed almost all the guidelines issued by AICTE/UGC/Affiliating University.

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

- **Foundation Courses (FC**) are further categorized as:
  (i) Humanities and Social Sciences including Management courses (HSMC)
  (ii) Basic Science Courses (BSC)
  (iii) Engineering Science Courses (ESC).
- **Core Courses (CC) and Elective Courses (EC)** are categorized as Professional Subjects (PS), which are further subdivided as –
  (i) Professional Core Courses(PCC)
  (ii) Professional Elective Courses(PEC)
  (iii) Open Elective Courses (OEC)
  (iv) Project (PROJ)
- **Mandatory Courses** (**MC** - Non-credit with evaluation).
- **Audit Courses** (**AC** – Non- credit without evaluation).

3.2.4 Course Nomenclature:

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

Sl.	Classification	Course Work – Subject Area	Distribution	AICTE Suggested

No.	AICTE	UGC		of credits	Breakup of Credits (Total 160)
1	HSMC	Foundation Courses	Humanities and Social sciences including Management courses.	11	12
2	BSC		Basic Sciences (BSC) including Mathematics, Physics, Chemistry and Biology.	21	25
3	ESC		Engineering Science Courses (ESC) including Engineering Workshop, Engineering Graphics, Basics of Electrical and Electronics / Mechanical / Computer Engineering.	38	24
4	PCC	Core Courses	Professional core Courses are relevant to the chosen specialization/branch; [May be split into Hard (no choice) and Soft (with choice)], if required.	48	48
5	PEC	Professional Electives	Professional electives are relevant to the chosen specialization/ branch.	18	18
6	OEC	Open Electives	Open electives are the courses from other technical and/or emerging subject areas.	09	18
7	PROJ	Project	Mini Project, Project and Seminar	15	15
8	MC	Mandatory Courses	These courses are non-credit courses with evaluation.	-	-
9	AC	Audit Courses	These courses are non-credit courses without evaluation.	-	-
Total credits for UGP (B.Tech.)					**160**

4.0 Course Registration

4.1 A 'Faculty Advisor or Counselor' shall be assigned to each student, who will advise him 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.

4.2 Academic section of the College invites 'Registration Forms' from students within 15 days from the commencement of class work for the first semester through 'ON-LINE SUBMISSIONS', ensuring 'DATE and TIME Stamping'. The ON-LINE registration requests for any 'SUBSEQUENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examinations) of the 'CURRENT SEMESTER'.

4.3 A Student can apply for ON-LINE Registration, ONLY AFTER obtaining the 'WRITTEN APPROVAL' from the Faculty Advisor/Counselor, which should be submitted to the College Academic Section through the Head of Department (a copy of it being retained with Head of Department, Faculty Advisor/Counselor and the Student).

4.4 A Student may be permitted to register for the Subjects/ Course of CHOICE with a typical deviation of ±3 credits of the semester, based on his PROGRESS and SGPA/CGPA and completion of the 'PRE-REQUISITES' as indicated for various Subjects/ Courses in the department course structure and syllabus contents. It needs specific approval and signature of the Faculty Advisor/Counselor and Head of the Department, 'within a period of 15 days' from the beginning of the current semester.

4.5 If the student submits ambiguous choices or multiple options or erroneous entries during ON-LINE 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.

4.6 Subject/ Course options exercised through ON-LINE registration are final and CANNOT be changed, nor can they be inter-changed; further, alternate choices will also not be considered. However, if the Subject/ Course that has already been listed for registration (by the Head of Department) in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice - either for a new Subject (subject to offering of such a Subject), or for another existing subject (subject to availability of seats), which may be considered. Such alternate arrangements will be made by the Head of the Department, with due notification and time-framed schedule, within the FIRST WEEK from the commencement of Class-work for that semester. Such changes are to be intimated to Chief Controller of Examinations/Principal immediately.

4.7 **Open Electives**: A student has to complete 3 Open Electives during the period of UGP. The students have to choose open electives from III year I semester onwards from the given list. However, the student cannot opt for an open elective subject offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.

4.8 **Professional Electives**: A student has to complete 6 Professional Electives during the period of UGP. Students have to choose professional electives from III year I semester onwards from the list of professional electives offered by their departments.

4.9 For Audit Courses like Sports/Yoga and NSS, MOOC/NPTEL online courses etc, a '**Satisfactory Participation Certificate**' from the authorities concerned for the relevant semester is essential. No Marks or Credits shall be awarded for these activities.

4.10 For Mandatory Courses, a '**Satisfactory / Not Satisfactory' grade** is awarded based on the performance in both CIE and SEE.

5.0 Subjects/ Courses to be offered

5.1 A typical Section (or Class) strength for each semester shall be 60.

5.2 A 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 to 72.

5.3 More than ONE TEACHER may offer the SAME SUBJECT (Lab / Practical may be included with the corresponding theory subject in the same semester) in any semester. However, selection choice for students will be based on 'FIRST COME FIRST SERVE' basis and 'CGPA Criterion'(i.e., the first focus shall be on early ON-LINE ENTRY from the student for registration in that semester and the second focus, if needed, will be on CGPA of the student).

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

6.0 Attendance Requirements:

6.1 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.

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

6.3 A stipulated fee prescribed by the CAC, shall be payable towards condoning of shortage of attendance.

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

6.5 Students, whose shortage of attendance is not condoned in any semester, are not eligible to register their Semester End Examinations, they get detained and their registration for that semester shall stand cancelled. 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.

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

7.0 Academic Requirements:

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

7.1 A student shall be deemed to have satisfied the Academic Requirements and earned the credits allotted to each Subject/ Course, if he / she secures not less than 35% marks in the Semester End Examination and with a minimum of 40% of the total marks allocated for the course; 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.

7.2 A student shall be deemed to have satisfied the Academic Requirements and earned the credits allotted to Mini Project/Technical Seminar/ Project, if he / she secure not less than 40% of the total marks to be awarded for each. The student would be treated as failed, if he (i) does not submit a report on his / her Mini Project / Technical 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 industry oriented Mini Project/ Technical 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.

7.3 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).

7.4 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 UGP.

7.5 After securing the necessary 160 credits as specified for the successful completion of the entire under graduate programme, the student can avail exemption of two subjects up to 6 credits, that is, one open elective and one professional elective subject or two professional elective/open electives subjects for optional drop out from these 160 credits earned; resulting in 154 credits for under graduate programme performance evaluation, i.e., the performance of the student in these 154 credits shall alone be taken into account for the calculation of the final CGPA (at the end of under graduate programme, which takes the SGPA of the IV year II semester into account) and shall be indicated in the grade card of IV year II semester. However, the performance of

student in the earlier individual semesters, with the corresponding SGPA and CGPA for which grade cards have already been given will not be altered.

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 to7.5.

7.7 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.

7.8 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.

7.9 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.

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, Minor Project, Major 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 30 Marks for CIE and 70 Marks for SEE decided in the Academic Council.

8.2 Theory Courses:

8.2.1 Continuous Internal Evaluation (CIE):

CIE shall be carried out for all courses of UG Programmes twice in a semester (2 Midterm examinations) with the help of objective evaluation, subjective evaluation, regular assignments and Attendance. Each mid term examination shall consist of objective test with a duration of 20 minutes, subjective paper shall be conducted with a duration of 90 minutes and one assignment. The composition of

objective test, subjective test, assignment and attendance shall be evaluated for 40%, 40%, 10% and 10% of the allocated internal marks.

Mid - Term Examination - UG				
Part	Type of Questions	No. of Questions	Marks per Question	Total
Part - A	Multiple – Choice Questions	20	1	20
Part - B	Choice questions (4 out of 6)	4	5	20
Mid Term Exam Total				40
Assignment				5
Attendance				5
Grand Total				**50**

*The CIE will be conducted for 50 marks and scaled to 30 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 subject wise attendance of each spell of instruction should be considered for the allocation of marks for attendance before each midterm examinations.

Percentage of Attendance	**Marks**
>90 and ≤100	5
>85 and ≤90	4
>80 and ≤85	3
>78 and ≤80	2
>75 and ≤78	1

The weightage for the midterm examination shall be given as 70% of the best performing midterm examination and 30% of the other midterm examination. The student shall appear for both midterm examinations, in case of any specific reason the student appears only one midterm examination, 70% weightage of that examination shall be considered.

8.2.2 Semester End Examination (SEE):

Semester End Examination (SEE) shall be conducted for all courses of UG

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			
Type of Questions	No. of Questions	Marks per Question	Total
Choice Questions: For each question there will be an 'either or choice', which means that there will be two questions from each module and the student should answer either of the two questions.	5	14	70

8.3 Practical Courses:

8.3.1 Continuous Internal Evaluation (CIE):

CIE marks shall be awarded with a distribution of 40% for day - to-day performance and timely submission of lab records, 40% for internal lab exam (best out of two exams) and 20% for viva-voce.The CIE will be conducted for 50 marks and scaled to 30 marks.

8.3.2 Semester End Examination (SEE):

SEE marks shall be awarded with a distribution of 20% for design/procedure/schematic diagram of the given experiment, 40% for conduction of experiment, 20% for results and 20% for viva-voce. For conducting SEE (with duration of 3hours), one internal examiner and one 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.

8.4 Engineering Graphics:

CIE: There will be 30% of total marks for CIE shall be awarded with a distribution of 40% of the CIE marks for day to day performance and timely

submission of drawing sheets and remaining 60% of CIE marks for midterm examinations.

The distribution of marks for CIE is given below

CIE for Engineering Graphics				
Part	Type of Questions	No. Of Questions	Marks per Question	Total
Part - A	Day – to – Day Work			20
Mid – Term Examination				
Part - B	Choice questions (4 out of 6)	4	7.5	30
Total				50

*The CIE will be conducted for 50 marks and scaled to 30 marks.

The distribution of marks for SEE is given below

SEE for Engineering Graphics			
Type of Questions	No. of Questions	Marks per Question	Total
Either or Choice from Each Module	5	14	70

8.5 Machine Drawing:

CIE: There will be 30% of total marks for CIE shall be awarded with a distribution of 40% of the CIE marks for day to day performance and timely submission of drawing sheets and remaining 60% of CIE marks for midterm examinations.

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			20
I Mid Term Examination			
Part Drawing (4 out of 6)	4	7.5	30
II Mid Term Examination			
Assembly Drawing (1 out of 2)	1	30	30
Total			50

*The CIE will be conducted for 50 marks and scaled to 30 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 - Part Drawing (2 out of 4)	2	15	30
Part B - Assembly Drawing (Compulsory Question)	1	40	40
Total			70

8.6 Projects:

8.6.1 Internship-III/Mini Project:

There shall be an Internship-III/Mini Project, in collaboration with an industry of their specialization. Students will register for this immediately after III year II semester (VI Semester) end examinations and pursue it during summer vacation. The evaluation of Mini project will be done at the end of IV Year I semester (VII semester). It shall be evaluated internally for 100 marks. The committee consisting Project Coordinator, Supervisor of the project and one senior faculty of the department will evaluate the mini Project and award appropriate Grade, based on the report submitted to the department and presentation provided by the student in front of the committee.

8.6.2 Project:

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

8.6.2 **(a)** For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall evaluate the project work for 70 marks and project supervisor shall evaluate for 30 marks. Two reviews shall be conducted. Review-I will be conducted within a month from the commencement of class work (problem definition, objective, literature survey) and Review-II will be conducted before second mid examination (brief description and sample case study, progress of work, presentation and report submission). Average of the two reviews will be taken for 100 marks. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) secures less than 40% marks. 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 subsequent semesters, as and when it is scheduled.

8.6.2. **(b)** Project Stage – II is the continuation of Project stage – I. It shall be evaluated by the external examiner for 70 marks and the project supervisor shall evaluate it for 30

marks. Two reviews should be conducted. Review-I will be conducted within a month from the commencement of class work (progress of work, discussion and presentation) and Review-II will be conducted before second mid examination (progress of work, results, discussion, presentation and report submission). Average of the two reviews will be taken for CIE. The Project Viva-voce (SEE) shall be conducted by a committee comprising of an External Examiner, Head of the Department and Project Supervisor. In SEE marks, 20% for working model/ simulation/data collection, 20% for report preparation and 60% for presentation

and viva-voce.The external examiner should be selected by Chief Controller of Examinations/Principal from outside the college among the autonomous/reputed institutions from a panel of three examiners submitted by the concerned Head of the Department.

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

8.7 Seminar:

For Seminar presentation, the student shall collect the information on a specialized topic, prepare a Technical Report and submit to the department at the time of seminar presentation. The seminar presentation (along with the technical 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.

8.8 Non-Credit Courses:

8.8.2 Mandatory Courses:

Mandatory Non-Credit Courses offered in any semester, a 'Satisfactory / Not Satisfactory' shall be awarded to the student based on the performance in both CIE and SEE.

8.8.3 Audit Courses:

Audit Courses offered in any Semester, a '**Satisfactory Participation Certificate**' shall be issued to the student from the concerned authorities, only after securing ≥ 65% attendance in such a course. 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.

9 Grading Procedure

9.1 Grades will be awarded to indicate the performance of each student in each theory subject, or Lab/ Practical or Seminar or Project or Mini-Project or Minor Course etc., based on the % of marks obtained in CIE + SEE both taken together as specified in Item No. 9 and a corresponding Letter Grade shall be given.

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

% of Marks	Grade Points	Letter Grade

≥90	10	O (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

9.3 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.

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

9.5 In general, a student shall not be permitted to repeat any Subject/ Course (s) only for the sake of 'Grade Improvement' or 'SGPA / CGPA Improvement'. However, he / 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).

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

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

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

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

$\mathrm{SGPA} = \left\{\sum_{i=1}^{N} C_i G_i\right\} / \left\{\sum_{i=1}^{N} C_i\right\}$ … 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.

9.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over all semesters considered for registration. The CGPA is the ratio of the Total Credit Points secured by a student in ALL registered courses in ALL semesters and the total number of credits registered in ALL the semesters. CGPA is rounded off to TWO decimal places. CGPA is thus

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

$CGPA = \{\sum_{j=1}^{M} C_j G_j\} / \{\sum_{j=1}^{M} C_j\}$… for all 'S' semesters registered

(i.e., up to and inclusive of 'S' semesters, $S \geq 2$)

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 1st 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 =

SGPA = 151/20 = 7.55

Illustration of calculation of CGPA:

Semester	Credits	SGPA	Credits X SGPA
Semester I	18	7	18 X 7 = 126
Semester II	20	6	20 X 6 = 120
Semester III	20	6.5	20 X 6.5 = 130
Semester IV	20	6	20 X6 = 120
Semester V	21	5.75	21 X 5.75 = 120.75
Semester VI	20	7.25	20 X 7.25 = 145
Semester VII	21	8	21 X 8 = 168
Semester VIII	20	8.5	20 X 8.5 = 170
	160		1099.75

CGPA = 1099.75/160 = 6.87

9.10 For merit ranking or comparison purposes or any other listing, ONLY the 'ROUNDED OFF' values of the CGPAs will be used.

9.11 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.

9.12 Passing Standards:

9.12.1 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 UGP, 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 UGP) for the degree award, as required.

9.12.2 Inspite 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 Items 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.

9.12.3 A student shall be declared successful in any Non-Credit Course, if he / she secures a 'Satisfactory Participation Certificate' for that Audit Course and "Satisfactory Grade' for Mandatory Course.

9.12.4 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

10.12 Computation of SGPA and CGPA are done using the procedure listed in items 9.6 to 9.10.

10.13 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 UG Programme (UGP) 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 the following classes:

Class Awarded	CGPA
First Class with Distinction	≥ 8.00
First Class	≥ 6.50 and < 8.00
Second Class	≥ 5.50 and < 6.50
Pass Class	≥ 5.00 and < 5.50

11.3 A student with final CGPA (at the end of the UGP) <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 undergraduate degree with honours or additional minor engineering, if he/she completes an additional 20 credits through MOOCs.

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 MR14/ MR15/ MR17 regulations due to lack of attendance, shall be permitted to join I year I Semester of MR18 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 MR14/ MR15 regulations for want of attendance shall be permitted to join the corresponding semester of MR18 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 MR18 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 MR14/ MR15 (2015-16 and 2016-17 admitted students)/ MR 17 regulations, who has been detained due to lack of credits, shall be promoted to the next semester of MR18 regulations only after acquiring the required credits as per the corresponding regulations of his/her first admission. 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 MR18 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 MR 18 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 MR18 regulations. The performance evaluation of the student will be done after the exemption of two subjects if total credits acquired are $\leq$ 206, three subjects if total credits acquired are > 206 (see MR18 regulations for exemption details).

3. If a student readmitted to MR18 regulations, has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in MR18 regulations will be substituted by another subject to be suggested by the College Academic Committee (CAC).

Note: If a student readmitted to MR18 regulations, has not studied any subjects/topics in his/her earlier regulations of study which is prerequisite for further subjects in MR18 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.

15 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 Principal is final.

Academic Regulations for B.Tech.(Lateral Entry Scheme)

w.e.f the A Y 2019-20

1. <u>Eligibility for award of B. Tech. Degree(LES)</u>

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

2. The student shall register for 122 credits and secure 122 credits with CGPA ≥ 5 from II year to IV year B.Tech. programme (LES) for the award of B.Tech. degree. **Out of the 122 credits secured, the student can avail exemption up to 6 credits**, that is, one open elective subject and one professional elective subject or two professional elective subjects resulting in 114 credits for B.Tech. programme performance evaluation**.**

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

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

5. Promotion Rule:

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 student takes those examinations or not.
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).

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	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.

	walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-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	The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over 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.

MALLA REDDY ENGINEERING COLLEGE (Autonomous)

COURSE STRUCTURE – B.Tech. ELECTRICAL AND ELECTRONICS ENGINEERING

(MR18 Regulations - Effective from Academic Year 2018-19 onwards)

SEMESTER-I							
Sl. No.	**Category**	**Course Code**	**Name of the Subject**	**L**	**T**	**P**	**Credits**
1			**Induction Programme**	-	-	-	-
2	HSMC	80H01	English	3	-	-	3
3	BSC	80B01	Engineering Mathematics - I	3	1	-	4
4	BSC	80B02	Applied Physics	3	1	-	4
5	ESC	80501	Programming for Problem Solving	3	-	-	3
6	HSMC	80H02	English Language Lab	-	-	2	1
7	BSC	80B04	Applied Physics Lab	-	-	2	1
8	ESC	80502	Programming for Problem Solving Lab	-	-	2	1
9	ESC	80303	Engineering Workshop	-	-	2	1
			Total	**12**	**2**	**8**	**18**
Total Contact Hours : 22							

SEMESTER-II							
Sl. No.	**Category**	**Course Code**	**Name of the Subject**	**L**	**T**	**P**	**Credits**
1	BSC	80B06	Engineering Mathematics - II	3	1	-	4
2	BSC	80B03	Engineering Chemistry	3	1	-	4
3	ESC	80201	Basic Electrical and Electronics Engineering	3	-	-	3
4	ESC	80503	Data Structures	3	-	-	3
5	ESC	80301	Engineering Graphics	1	-	2	2
6	BSC	80B05	Engineering Chemistry Lab	-	-	2	1
7	ESC	80202	Basic Electrical and Electronics Engineering Lab	-	-	2	1
8	ESC	80302	Engineering Graphics Lab	-	-	2	1
9	ESC	80504	Data Structures Lab	-	-	2	1
10	AC	80A01	NSS/SPORTS/YOGA	-	-	3	-
Total				**13**	**2**	**13**	**20**
Total Contact Hours : 28							

MALLA REDDY ENGINEERING COLLEGE (Autonomous)

COURSE STRUCTURE – B.Tech. ELECTRICAL AND ELECTRONICS ENGINEERING

(MR18 Regulations - Effective from Academic Year 2018-19 onwards)

SEMESTER-III							
Sl. No.	**Category**	**Course Code**	**Name of the Subject**	**L**	**T**	**P**	**Credits**
1	BSC	80B10	Special Functions and Complex Variables	3	-	-	3
2	ESC	80401	Analog Electronics	3	-	-	3
3	ESC	80316	Fluid Mechanics and Hydraulic Machines	3	-	-	3
4	PCC	80203	Electrical Circuit Analysis and Synthesis	3	1	-	4
5	PCC	80204	Electromagnetic Fields	3	-	-	3
6	ESC	80319	Fluid Mechanics and Hydraulic Machines Lab	-	-	2	1
7	ESC	80406	Analog Electronics Lab	-	-	2	1
8	PCC	80205	Electrical Circuits Lab	-	-	4	2
9	MC	80M02	Gender Sensitization	2	-	-	-
10	AC	80A02	Internship - I	-	-	-	-
Total				**17**	**1**	**8**	**20**
Total Contact Hours : 26							

SEMESTER-IV							
Sl. No.	**Category**	**Course Code**	**Name of the Subject**	**L**	**T**	**P**	**Credits**
1	HSMC	80H04	Engineering Economics & Accountancy	3	-	-	3
2	PCC	80206	Electrical Measurements and Instrumentation	3	-	-	3
3	PCC	80207	DC Machines and Transformers	3	1	-	4
4	PCC	80208	Power Generation and Distribution	3	-	-	3
5	PCC	80209	Control Systems	3	-	-	3
6	PCC	80210	Electrical Measurements and Instrumentation Lab	-	-	2	1
7	PCC	80211	DC Machines and Transformers Lab	-	-	3	1.5
8	PCC	80212	Control Systems Lab	-	-	3	1.5
9	MC	80M01	Environmental Science	2	-	-	-
Total				**17**	**1**	**8**	**20**
Total Contact Hours : 26							

MALLA REDDY ENGINEERING COLLEGE (Autonomous)

COURSE STRUCTURE – B.Tech. ELECTRICAL AND ELECTRONICS ENGINEERING

(MR18 Regulations - Effective from Academic Year 2018-19 onwards)

SEMESTER-V							
Sl. No.	**Category**	**Course Code**	**Name of the Subject**	**L**	**T**	**P**	**Credits**
1.	ESC	80403	Digital Electronics	2	1	-	3
2.	PCC	80213	AC Machines	3	1	-	4
3.	PCC	80214	Power Transmission Systems	3	1	-	4
4.	PCC	80215	Power Electronics	3	-	-	3
5.	PEC-I	80222	High Voltage Engineering	3	-	-	3
		80223	Graphical Programme and Applications				
		80224	Advanced Control Systems				
6.	ESC	80413	Digital Electronics Lab	-	-	2	1
7.	PCC	80216	AC Machines Lab	-	-	3	1.5
8.	PCC	80217	Power Electronics Lab	-	-	3	1.5
9.	MC	80M04	Indian Constitution	2	-	-	-
10.	AC	80A03	Internship - II	-	-	-	-
			Total	**16**	**3**	**8**	**21**
							Total Contact Hours : 27

SEMESTER-VI							
Sl. No.	**Category**	**Course Code**	**Name of the Subject**	**L**	**T**	**P**	**Credits**
1.	ESC	80402	Signals and Systems	2	1	-	3
2.	ESC	80414	Microprocessors and Microcontrollers	3	-	-	3
3.	PCC	80218	Switchgear and Protection	3	1	-	4
4.	PEC-II	80225	Electrical Drives	3	-	-	3
		80226	Electrical Machine Design				
		80227	Electrical Estimation & Costing				
5.	OEC-I		Open Elective - I	3	-	-	3
6.	HSMC	80H03	English Communication & Presentation Skills Lab	-	-	2	1
7.	ESC	80445	Basic Simulation Lab	-	-	3	1.5
8.	ESC	80417	Microprocessors and Microcontrollers Lab	-	-	3	1.5
9.	MC	80M03	Essence of Indian traditional knowledge	2	-	-	-
			Total	**16**	**2**	**8**	**20**
							Total Contact Hours : 26

MALLA REDDY ENGINEERING COLLEGE (Autonomous)

COURSE STRUCTURE – B.Tech. ELECTRICAL AND ELECTRONICS ENGINEERING

(MR18 Regulations - Effective from Academic Year 2018-19 onwards)

SEMESTER-VII							
Sl. No.	**Category**	**Course Code**	**Name of the Subject**	**L**	**T**	**P**	**Credits**
1	HSMC	80H05	Management Fundamentals	3	-	-	3
2	PCC	80219	Power System Analysis and Control	3	-	-	3
3	PEC-III	80228	Wind and Solar Energy Systems	3	-	-	3
		80229	Electrical Hybrid Vehicles				
		80420	Digital Signal Processing				
4	PEC-IV	80230	Utilization of Electrical Energy	3	-	-	3
		80231	HVDC and FACTS				
		80232	Special Machines				
5	OEC-II		Open Elective - II	3	-	-	3
6	PROJ	80P01	Internship – III / Mini Project	-	-	-	2
7	PROJ	80P02	Project Stage –I	-	-	4	2
8	PCC	80220	Power Systems Lab	-	-	2	1
9	PCC	80221	Electronic Design Lab	-	-	2	1
			Total	**15**	**-**	**8**	**21**
							Total Contact Hours : 23

SEMESTER-VIII							
Sl. No.	**Category**	**Course Code**	**Name of the Subject**	**L**	**T**	**P**	**Credits**
1	PEC-V	80233	Electrical Power Quality	3	-	-	3
		80234	Electrical Energy Conservation and Auditing				
		80235	Electrical Smart Grid				
2	PEC-VI	80236	Programmable logic controllers and their applications	3	-	-	3
		80237	Supervisory Control and Data Acquisition				
		80238	Neural Networks and Fuzzy Logic				
3	OEC-III		Open Elective -III	3	-	-	3
4	PROJ	80P03	Seminar	-	-	2	1
5	PROJ	80P04	Project Stage –II	-	-	20	10
			Total	**9**	**-**	**22**	**20**
							Total Contact Hours : 31

LIST OF OPEN ELECTIVES

S.No	Branch	Course Code	Name Of The Course	No.of Credits
1	**CIVIL**	80139	Environmental Impact Assessment and Life Cycle Analysis	3
2		80148	Green Buildings	3
3		80149	Disaster Management & Mitigation	3
4	**EEE**	80234	Electrical Energy Conservation and Auditing	3
5		80240	Electrical Safety and Energy Management	3
6		80241	Energy Storage Systems	3
7	**MECH**	80352	Total Quality Management	3
8		80356	Industrial Safety	3
9		80357	Renewable Energy Sources	3
10	**ECE**	80435	Embedded System Design	3
11		80446	Principles of Communication Engineering	3
12		80447	Basics of VLSI Design	3
13	**CSE**	80512	Database Management Systems	3
14		80521	Big Data Analytics	3
15		80535	Cloud Computing	3
16	**IT**	80605	Android Application Development	3
17		80606	Python Programming	3
18		80617	Artificial Intelligence	3
19	**MINING**	82507	Drilling And Blasting	3
20		82537	Material Handling	3
21		82542	Tunneling Engineering	3
22	**ENGLISH**	80H07	English Language Skills	3
23		80H08	Interpretation Skills and Analytical Writing	3
24		80H09	English for Academic and Research Writing	3
25	**MATHEMATICS**	80B11	Computational Mathematics	3
26		80B12	Applied Statistics	3
27		80B13	Optimization Techniques	3
28	**PHYSICS**	80B14	Advanced Physics for Engineers	3
29		80B15	Nano Materials	3
30		80B16	NDT and Vacuum Technology	3
31	**CHEMISTRY**	80B17	Chemistry of Engineering Materials	3
32		80B18	Nano Chemistry	3
33		80B19	Polymer Chemistry	3

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 80H01	**ENGLISH**	**L**	**T**	**P**
Credits: 3	(Common for EEE, ECE,CSE and IT)	**3**	**-**	**-**

Prerequisites: Nil

Course Objectives:

The objective of this course is to improve the English Language competency of the students, which emphasizes on all language components namely grammar, vocabulary, prose, short stories. Further, it also helps in developing the skills of Reading and Writing. As a result students are equipped to study the academic subjects more effectively using the theoretical and practical components of the English syllabus.

MODULE – I: **10 Periods**

Essay **:** "Minimalism—Live a Meaningful Life" by Joshua Millburn and Ryan Nicodemus
Poem **: "**Road Not Taken" by Robert Frost
Vocabulary **:** Formation of Words, Prefixes, Suffixes, and Root Words
Grammar **:** Articles and Prepositions
Reading **:** Skimming and Scanning
Writing **:** Introduction to Writing Skills, Characteristics of Effective Writing

MODULE - II: **10 Periods**

Essay **:** "Knowledge Society" an excerpt from *Ignited Minds* by A.P.J Abdul Kalam
Poem **:** "Life" by Sarojini Naidu
Vocabulary **:** Homonyms, Homophones, Homographs
Grammar **:** Sentence Structures, Voice – Exercises
Reading **:** Intensive Reading and Extensive Reading
Writing **:** Paragraph Writing- use of cohesive devices; Arranging Jumbled Sentences into Paragraph and Punctuation

Module - III: **10 Periods**

Short Story **:** " Half a Rupee Worth**"** by R.K Narayan .
Poem **:** " If" by Rudyard Kipling
Grammar **:** Tense, Aspect and Concord
Vocabulary **:** Idiomatic Expressions; Phrasal Verbs
Reading **:** Reading for Theme and Gist.
Writing **:** Essay Writing, Describing, Defining and Classifying

MODULE - IV: **9 Periods**

Biography **:** "Jesse Owens"
Poem **:** "I too Sing America" by Langston Hughes
Grammar **:** Question Tags; Degrees of Comparison
Vocabulary **:** One Word Substitutions; Synonyms and Antonyms
Reading **:** Reading for Interpretation
Writing **:** Letter Writing- Both Formal and Informal

Module - V: **9 Periods**

Essay : " Pecuniary Independence" by P.T Barnum
Poem **:** " Human Family" by Maya Angelou
Grammar **:** Direct and Indirect Speech, Misplaced Modifiers
Vocabulary **:** Integrated Exercises in Vocabulary
Reading **:** Reading for Specific Purposes, Reading Comprehension
Writing **:** Summarizing, Redundancies and Clichés

* Exercises from the texts not prescribed shall also be used for classroom tasks.

Text books:

1. T.V.Surendranatha Reddy, B.Vijay Kumar and K.James. *"***Effective English"**, First Edition, Maruthi Publications, 2017.

References:

1. Azar, Betty and Stacy A, Hagen**,***Understanding and Using English Grammar*, Foundation Books, 4th Edition, 2009.
2. Chaudhuri, Santanu Sinha, *Learn English: A Fun Book of Functional Language, Grammar and Vocabulary,* New Delhi: Tata McGraw Hill Education, , Paper Back Edition. 2013.
3. Eastwod, John: *Oxford Guide to English Grammar,* Oxford University Press, 4th Edition, 1994.
4. Field, Marion**,** *Improve Your Written English*, Kindle books, 5th Edition, 2009.
5. G. Leech and J. Svartvik , *A Communicative Grammar of English,* London: Longman, 3rd Edition, 2002.

E-Resources:

1. http://www.slideshare.net/aszardini/word-formationroot-words-prefixes-and-suffixes
2. http://www.scribd.com/doc/37085980/Circulars-Circular-Letters-Notices-Memo#scribd.
3. http://www.zsme.tarnow.pl/jezykiobce/wp-content/uploads/2013/11/writing-letters1.pdf.

Course Outcomes:

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

1. Use English considerably well in written and spoken.
2. Enrich language accurately and fluently.
3. Employ extensive and intensive reading skills
4. Gain confidence in using English language and skills for writing in real life situations.
5. Use standard grammar, punctuation, and spelling in documents.

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	3					
CO2										3	2				
CO3		1	1												
CO4							1	2		2		2			
CO5		1	2				1			2					

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 80B01	**ENGINEERING MATHEMATICS - I**	**L**	**T**	**P**
Credits: 4	(Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	**3**	**1**	**-**

Prerequisites: Basics of Matrices and Calculus

Course Objectives: To learn types of matrices and their properties, rank of the matrix to know the consistency and solving the system of linear equations. To find Eigen values, eigen vectors and to reduce the quadratic form to canonical form. To understand the concept of Sequence and series, Geometrical approach to the mean value theorems and their application to the mathematical problems.

Module - I: Matrices **12 Periods**

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. LU - Decomposition Method.

Module - II: Eigen values and Eigen vectors **14 Periods**

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

Module - III: Sequences & Series **12 Periods**

A: Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences. Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test

B: Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

Module - IV: Fourier Series **12 Periods**

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

Module - V: Calculus **14 Periods**

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

Text Books:

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

References:

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

E- Resources:

1. http://www.yorku.ca/yaoguo/math1025/slides/chapter1/Kuttler-LinearAlgebra-Slides-SystemsofEquations-Handout.pdf (Systems of linear equations, matrices)
2. https://www.math.cmu.edu/~wn0g/2ch6a.pdf (Differential Calculus)
3. http://tutorial.math.lamar.edu/Classes/CalcII/ConvergenceOfSeries.aspx (Sequences & Series)
4. http://www.aidic.it/cet/16/51/055.pdf (Differential Calculus)
5. http://nptel.ac.in/courses/108106075/8 (Fourier Series)

Course Outcomes:

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

1. Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations.
2. Find the Eigen values and Eigen vectors and reduce the quadratic form to canonical form using orthogonal transformations.
3. Analyse the nature of sequence and series.
4. Determine Fourier series for different functions
5. Solve the applications on the mean value theorems and evaluate the improper integrals using Beta and Gamma functions.

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			3			
CO2	3	2	2	3	2				2			3			
CO3	3	2	2	3	2				2			2			
CO4	3	2	2	3	3				2			2			
CO5	3	2	2	3	3				2			2			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 80B02	APPLIED PHYSICS	L	T	P
Credits: 4	(Common for EEE, ECE, CSE and IT)	3	1	-

Prerequisites: Fundamentals of Physics

Course Objectives:

The main objective of this course is to provide an adequate exposure and develop insight about the basic principles of semiconductor physics along with the possible applications.

Module-I Principles of Quantum Mechanics 12 periods

Qualitative discussion on black body radiation spectrum problem, Photo electric effect concept and Einstein's explanation; Postulates of Quantum mechanics, Louis de Broglie's concept of matter waves, Davisson and Germer's experiment, Heisenberg's Uncertainty Principle, Schrödinger's Time Independent Wave Equation, Physical Significance and properties of the Wave Function; Energy of a particle in One Dimensional infinite Potential well.

Module –II Band Theory of Solids 12 periods

Free electron theory of metals(Qualitatively), Fermi Level, Density of Energy States and Energy Band Diagrams, Bloch theorem for particle in a periodic potential (Qualitatively), Kronig-Penny Model(Qualitatively), E-K Diagram, Origin of Energy Bands in solids, Effective mass of an electron, Distinction between Metals, Semiconductors and Insulators.

Module –III Semiconductor Physics 12 periods

A: Intrinsic and Extrinsic Semiconductors, Expression for carrier concentration in intrinsic and extrinsic semiconductor, Qualitative treatment of Fermi energy level in Intrinsic and extrinsic semiconductors,

B: Direct and indirect band gap semiconductors, Carrier generation and Recombination, Drift and Diffusion, Equation of Continuity. P-N Junction: Formation & V-I Characteristics, LED: Construction and Working Principle, Solar Cell: Construction & I-V Characteristics.

Module –IV **14 periods**

Lasers and Fiber Optics:

Lasers: Introduction to interaction of radiation with matter, Coherence, Einstein's coefficients, Principle and working of Laser, Population inversion, Pumping, Semiconductor LASER, Applications of laser.

Fiber Optics: Introduction, Optical fiber as a dielectric wave guide, Total Internal Reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibers, Losses associated with optical fibers, Applications optical fibers.

Module –V

Electromagnetic Theory **14 Periods**

Gradient of Scalar field and its Physical Significance; Divergence and Curl of Vector field; Qualitative treatment of Gauss's Law of electrostatics and Gauss law of magnetostatics, Ampere's law and its modification, Faraday's law of electromagnetic induction, Induced E.M.F in a conductor, Lenz's Law, Maxwell equations in differential form, wave equation for free space.

Text Books:

1. K Vijaya Kumar, S Chandralingam, "**Modern Engineering Physics**'' Volume I & II, S. Chand, 1st Edition, 2017.
2. J.Singh,"Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill.ink, 1995.

References:

1. P K Palanisamy, **"Engineering Physics"**, SciTech Publication, 4th Edition, 2014.
2. B K Pandey and S. Chaturvedi, "**Engineering Physics**" Cengage Learning India, Revised Edition, 2014.
3. R K Gaur and SL Gupta, "**Engineering Physics**" Dhanpat Rai Publications, Eighth Revised Edition, 2006.
4. D K Bhattacharya, Poonam Tandon, "**Engineering Physics**", Oxford University Press, 1st Edition, 2015.
5. P. Bhattacharya, "**Semiconductor Optoelectronic Devices**", Prenticehall of India,1997

E-Resources

1. https://www.researchgate.net/publication/259574083_Lecture_Notes_on_Engineering_Physics
2. https://www.researchgate.net/publication/292607115_Applied_Physics
3. http://www.springer.com/physics/theoretical%2C+mathematical+%26+computational+physics/journal/40094
4. http://www.springer.com/physics/journal/340
5. http://nptel.ac.in/courses/113104012/

6. https://www.youtube.com/watch?v=jnjjWI1s9_s&list=PLzJaFd3A7DZse2tQ2qUFChSiCj7jBidO0
7. https://www.youtube.com/watch?v=4a0FbQdH3dY

Course Outcomes:

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

1. Acquire the theoretical information about matter in terms of quantum physics
2. Analyze the formation the bands thereby classification of materials on the basis of transport properties.
3. Understand the fundamentals of semiconductor physics and also the Optoelectronics
4. Be aware of the concepts and applications of LASER and Optical fibers.
5. Apply basic knowledge on electromagnetic principles and using these wave equations for the propagation

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**	**1**												
CO2	**3**	**1**	**2**												
CO3	**3**	**2**	**2**												
CO4	**3**	**2**	**2**												
CO5	**2**	**2**	**1**												

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 80501	**PROGRAMMING FOR PROBLEM SOLVING** (Common for EEE, ECE, CSE and IT)	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: NIL

Course Objectives:

This course provides the fundamental concepts of computers and introduce to the students to the field of programming using C language, apply the control structures, iterations statements, arrays, functions, strings, pointers, structures, unions and files. This course also explains the concepts of searching and sorting techniques in C language.

MODULE I: Fundamentals and Introduction to 'C' Language 11 Periods

Fundamentals: Hardware, Software, Programming languages, Number Systems, Translators, Introduction to Operating System, Program Development steps - Algorithm, Flow charts.

Introduction to 'C' Language: History, Simple C Program, Identifiers, Preprocessor Directives- Include and define, Basic data types, User-defined data types, Variables, Constants, Type qualifiers, Managing Input / Output, Operators, Precedence and Associativity, Expression Evaluation, Type conversions, Simple 'C' Programming examples.

MODULE II: Control Statements & Arrays 9 Periods

Control Statements: Conditional statements- if and switch statements, ternary operator?: , Loop Control Statements – while, for, do-while, break, continue and goto statements.

Arrays: Basic concepts, One-dimensional arrays, Two–dimensional arrays, Multi-dimensional arrays.

MODULE III: Strings & Pointers 9 Periods

A: Basic concepts, String Input / Output functions, Arrays of strings, String handling functions.

B: Basic concepts, Pointer arithmetic, Pointers and strings, Pointers and arrays, Dynamic Memory Allocation**.**

MODULE IV: Functions & Derived Types 9 Periods

Functions - Basics, User defined functions, Inter function communication, Library functions, Storage Classes-auto, register, static, extern, Scope rules, Array and string manipulations using functions, Recursive functions, Pointers and functions.

Derived types - Structures – Basic concepts, Nested structures, Arrays of structures, Structure manipulations using functions, Pointers to structures, Self-referential structures, Unions, bit fields

MODULE V: File I/O, Sorting and Searching **10 Periods**

File I/O: Basic concepts, Text files and Binary files, File input / output operations, File status functions (error handling), Command-Line Arguments, C programming examples.
Sorting and Searching: Sorting - selection sort, bubble sort, insertion sort, searching - linear and binary searching methods**.**

Text Books

1. PradipDey, Manas Ghosh, **"Programming in C**", Oxford University Press, 2nd Edition, 2011.
2. E. Balagurusamy, "**Computer Programming in C"**, Tata McGraw Hill, 1st Edition, 2013.

References

1. Brian W. Kernighan, Dennis M. Ritchie, "**The C Programming Language"**, PHI, 2nd Edition, 1990.
2. Greg Perry and Dean Miller, "**C Programming Absolute beginner's guide**", QUE Publishers, 3rd Edition, 2013.
3. Paul Deitel and Harvey Deitel, "**C How to Program"**, PHI, 7th Edition, 2012.
4. Behrouz A. Forouzan, E.V.Prasad, Richard F. Gilberg, "**C programming: A Problem- Solving Approach**", Cengage Learning Press, 1st Edition, 2011.

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. Understand the basic terminology, write, compile and debug programs in computer programming.
2. Apply different types of control structures and arrays in a computer programming.
3. Develop programs that make use of concepts such as strings and pointers in C language.
4. Compare parameter passing techniques, structures and unions in computer programming.
5. Analyze file operations, searching and sorting methods.

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**											
CO2			**3**		**2**										
CO3		**2**	**2**		**2**										
CO4			**3**		**3**										
CO5		**2**	**2**		**3**										

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 80H02	**ENGLISH LANGUAGE LAB** (Common for EEE, ECE, CSE and IT)	**L**	**T**	**P**
Credits: 1		**-**	**-**	**2**

Course Objectives:

To sensitize the students to the intelligibility in their pronunciation of English, speech sounds, word accent, intonation and rhythm. It also helps to improve the fluency in spoken English and make them aware of nuances of major skills, *viz* listening and speaking skills. Hence it helps to train the students to understand nuances of both verbal and non verbal communication during all activities. The purpose of this course is to develop confidence levels of the students and to face the audience and participate in public speaking.

Listening Skills:

Objectives:

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

Students should be given practice in listening to the sounds of the language to be able to recognize them, awareness regarding stress and recognize and use the right intonation in sentences.

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

Speaking Skills:

Objectives:

1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.

• Oral practice
• Describing objects/situations/people
• Just A Minute (JAM) Sessions.

a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

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

Module - I:

CALL Lab: Introduction to Phonetics – Speech Sounds – Vowels and Consonants

ICS Lab: Ice-Breaking activity and JAM session
Listening: listening for sounds in context, for ideas.
Speaking: ideation and translation of ideas into sentences.

Module - II:
CALL Lab: Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.
ICS Lab: Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette.
Listening: listening for specific purposes, for details.
Speaking: speaking in the above situations with clarity, connectivity, maintaining voice characters.

Module - III:
CALL Lab: Word accent and Listening Comprehension-reading(aloud) meaningfully.
ICS Lab: Descriptions- Narrations- Giving Directions and guidelines.
Listening: listening for intelligible English
Speaking: formal and informal conversations, register.

Module - IV:
CALL Lab: Intonation and Common errors in Pronunciation- reading aloud(evaluating through recording).
ICS Lab: Extempore- Public Speaking, Oral Presentation Skills
Listening: note taking and listening for speaker's tone/attitude
Speaking: organizing, connecting ideas and sentences, short forms in spoken English, errors in spoken English

Module - V:
CALL Lab: Neutralization of Mother Tongue Influence and Conversation Practice
ICS Lab: Information Transfer, Debate

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

Reference Books:

1. Gairns ,Ruth and Redman , Stuart: *Oxford Word Skills, Learn and Practice English Vocabulary*, 2nd Edition, 2008.
2. Hughes , John and Mallett , Andrew: *Successful Presentations:* DVD and Student's Book Pack: A Video Series Teaching Business Communication Skills for Adult Professionals
3. Hamcock, *English pronunciation in use* (Intermediate),Cambridge university Press,2009

4. Karia , Akash: *Public Speaking Mastery*, *Speak Like a Winner* , Kindle Edition, 2013.

5. Lucas, Stephen: *The Art of Public Speaking"* : Tata McGraw Hill, 11th Edition, 2011.

E - RESOURCES:

1. http://www.mindtools.com/CommSkll/ActiveListening.htm
2. http://www.slideshare.net/alisonkis/dialogue-and-roleplay-activity
3. http://www.hse.ru/pubs/lib/data/access/ram/ticket/2/14309868938d576a532b71360b7354268380727a22/An%20article%20for%20Monika%20(2010).pdf

Course Outcomes:

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

1. Understand the nuances of language through audio- visual experience and group activities
2. Neutralize the accent for intelligibility
3. Realize the importance of listening skills and speaking skills and their application in real life situations.
4. Recognize significance of non-verbal communication and develop confidence to face audience and shed inhibitions.
5. Speak with clarity and confidence thereby enhance employability skills of the students.

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**				**1**		**1**	**2**	**2**		**1**			
CO2										**1**		**1**			
CO3							**1**		**1**	**2**		**2**			
CO4								**1**	**1**	**2**		**2**			
CO5										**2**		**2**			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 80B04	**APPLIED PHYSICS LAB**	**L**	**T**	**P**
Credits: 1	(Common for EEE, ECE, CSE and IT)	-	-	**2**

Course Objectives:

The main objective of this course is to provide the necessary exposure to the practical aspects, which is an essential component for learning science.

List of Experiments:

1. **Planck's constant:** To determine Planck's constant using Photo electric effect.
2. **Energy band –gap of a semiconductor**: To determine the energy band gap of a semiconductor
3. **V-I and P-I characteristics of light emitting diode:** Plot V-I and P-I characteristics of light emitting diode
4. **Laser diode:** To study the Characteristics of Laser diode
5. **Solar Cell:** To study the V-I Characteristics of solar cell
6. **LCR Circuit:** To determination of resonant frequency, bandwidth and quality factor of RLC circuit.
7. **Numerical Aperture of an Optical fiber:** To determine the Numerical aperture of the given fiber
8. **Bending Loss of a Fiber:** To determine the bending loss of the given fiber.
9. **Light Dependent Resistance (LDR):** To determine the characteristics of a LDR
10. **Stewart and Gee's experiment:**Determination of Magnetic field along the axis of current carrying circular coil
11. **Torsional Pendulum:** To determine the rigidity modulus of a given wire
12. **Sonometer:** To verify the frequency of AC Supply

Course Outcomes:

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

1. Develop skills to impart practical knowledge in real time solution.
2. Understand principle, concept, working, application and comparison of results with theoretical calculations.
3. Design new instruments with practical knowledge.
4. Understand measurement technology,
5. Use new instruments and real time applications in engineering studies.

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												
CO2	3	1	1												
CO3	3														
CO4	3														
CO5	3														

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 80502	PROGRAMMING FOR PROBLEM SOLVING LAB (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: 1		-	-	2

Course Objectives:

This course provides the fundamental concepts of programming using C language, apply the control structures, iterations statements, arrays, functions, strings, pointers, structures, unions and files. This course also explains the concepts of searching and sorting techniques in C language.

Software Requirements: Turbo C

List of Programs:

1. a. Practice various Internal and External DOS Commands.
   b. Implement various programs logics using algorithms and flowcharts.
   c. Write sample examples of C programs to implement basic operations.
2. a. Write a C program to find smallest and largest of given three numbers.
   b. Write a C program to find the roots of a quadratic equation.
3. a. Write a C program to find the sum of individual digits of a positive integer.
   b. 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.
   c. Write a C program to generate the first n terms of the sequence.
4. a. Write a C program to find whether the given number is palindrome, perfect, Armstrong or strong.
   b. Write a C program to generate all the prime numbers between n1 and n2, where n1 and n2 are values supplied by the user.
5. Write C programs that use both recursive and non-recursive functions
   a. To find the factorial of a given integer.
   b. To find the GCD (greatest common divisor) of two given integers.
6. a. Write a C program to find both the largest and smallest number in a list of integers.
   b. Write a C program that uses functions to perform the following:
      i. Addition of Two Matrices
      ii. Multiplication of Two Matrices
7. a. Write a C program that uses functions to perform the following operations:
      i. To insert a sub-string into given main string from a given position.
      ii. To delete n characters from a given position in a given string.
   b. Write a C program to determine if the given string is a palindrome or not
   c. Write a C program to find substring in a given string.
   d. Write a C program to count the lines, words and characters in a given text.
8. a. Write a C program to implement functions arguments with different returns values.
   b. Write a C program to implement call by value and call by reference using functions.

9 a. Write a C program to find grades of a student's using structures and unions.
   b. Write a C program to implement nested structures.
10 a. Write a C program which copies one file to another.
   b. Write a C program to command line arguments.
11 a. Write a C program that uses non-recursive function to search for a Key value in a given list of integers using linear search.
   b. Write a C program that uses recursive and non -function to search for a Key value in a given sorted list of integers using Binary search.
12 a. Write a C program that implements the Selection sort method to sort a given array of integers in ascending order.
   b. Write a C program that implements the Bubble sort method to sort a given list of names in ascending order.

Text Books

1. PradipDey, ManasGhosh, **"Programming in C**", Oxford University Press, 2nd Edition, 2011.
2. E.Balagurusamy, "**Computer Programming in C"**, Tata McGraw Hill, 1st Edition, 2013.

References

1. Brian W. Kernighan, Dennis M. Ritchie, "**The C Programming Language"**, PHI, 2nd Edition, 1990.
2. Greg Perry and Dean Miller, "**C Programming Absolute beginner's guide**", QUE Publishers, 3rd Edition, 2013.
3. Paul Deitel and Harvey Deitel, "**C How to Program"**, PHI, 7th Edition, 2012.
4. Behrouz A. Forouzan, E.V.Prasad, Richard F.Gilberg, "**C programming: A Problem- Solving Approach**", Cengage Learning Press, 1st Edition, 2011.

Course Outcomes:

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

1. Analyze concepts in problem solving do programming in C language and write diversified solutions using C language.
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 run 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 the task.

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	3	2											
CO2			3		2										
CO3		2	2		2										
CO4			3		3										
CO5		2	2		3										

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: 80303	**ENGINEERING WORKSHOP** (Common for EEE, ECE, CSE and IT)	**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. Black smithy
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	PSO1	PSO2	PSO3
CO1	3				2	2	1		3			3			
CO2	3				2	2	1		3			3			
CO3	3				2	2	1		3			3			
CO4	3				2	2	1		3			3			
CO5	3				2	2	1		3			3			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 80B06	ENGINEERING MATHEMATICS - II (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	L	T	P
Credits: 4		3	1	-

Prerequisites: Basics of Calculus

Course Objectives: To learn

- Methods of solving the differential equations of first and higher order.
- Evaluation of multiple integrals and their applications
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surface and volume integrals Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables

Module - I: First Order ODE **13 Periods**

Exact, linear and Bernoulli's equations; Applications: Newton's law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Module - II: Ordinary Differential Equations of Higher Order **13 Periods**

Rules for finding Complementary function-Particular integral (Non-homogeneous term of the type e^{ax}, $\text{Sin } bx$ / $\text{Cos } bx$, x^n, $e^{ax}V(x)$, $x^nV(x)$only), Method of variation of parameters. Equations reducible to constant coefficients - Cauchy - Euler and Legendre's equations.

Module - III: Multivariable Calculus **12 Periods**

A:Definitions of Limit and continuity. Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence & independence.

B:Maxima and minima of functions of two variables and three variables using Lagrange's method of undetermined multipliers.

Module - IV: Multiple Integrals **13 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.

Module - V: Vector Calculus **13 Periods**

Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Scalar potential functions.

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

Text Books

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

References

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

E-Resources

1. https://www.math.ust.hk/~machas/differential-equations.pdf (Differential equations)
2. http://www.staff.ttu.ee/~lpallas/multipleintegrals.pdf (Multiple Integrals)
3. http://www.mecmath.net/calc3book.pdf (Vector Calculus)
4. http://www.sciencedirect.com/science/article/pii/0022247X7690216X (Multiple Integrals)
5. http://nptel.ac.in/courses/122107037/20 (Differential Equations of first order and first degree)
6. http://nptel.ac.in/courses/122104017/28 (Multiple Integrals)

Course Outcomes

At the end course, students will be able to

1. Identify whether the given differential equation of first order is exact or not
2. Solve higher differential equation and apply the concept of differential equation to real world problems
3. Determine extreme values of a function
4. Evaluate the multiple integrals and apply the concept to find areas, volumes.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

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			2	2		3			
CO2	3	3	3	3	2	2			2			3			
CO3	3	3	3	3	2	2			2	2		3			
CO4	3	3	3	3	3				2			3			
CO5	3	3	3	3	2	3			2	2		3			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech II Semester		
Code: 80B03	ENGINEERING CHEMISTRY (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: 4		3	1	-

Prerequisites: Nil

Course Objectives:

The purpose of this course is to emphasize the relevance of fundamentals of chemical sciences in the field of engineering and to provide basic knowledge on atomic- molecular orbital's, electrochemistry, batteries, corrosion and the role of water as an engineering material in domestic-industrial use. They will also impart the knowledge of stereochemistry, understanding the chemical reaction pathway mechanisms and synthesis of drugs.

Module I: Water and its treatment **12 Periods**

Introduction to water, hardness of water, causes of hardness, expression of hardness, units and types of hardness-Numerical Problems. Alkalinity of water, specifications of potable water (BIS); Estimation of temporary & permanent hardness of water by EDTA method. Boiler troubles - Scale & Sludge, Priming and foaming, caustic embrittlement and boiler corrosion; Treatment of boiler feed water - Internal treatment (colloidal, phosphate, carbonate and calgon conditioning). External treatment - Lime Soda process (cold & hot) and ion exchange process, Numerical Problems. Disinfection of water by chlorination and ozonization. Desalination by Reverse osmosis and its significance.

Module II: Molecular structure and Theories of Bonding: **12 Periods**

Introduction to Molecular orbital Theory. Linear Combination of Atomic Orbital's (LCAO), significance of bonding and anti-bonding molecular orbital, Conditions for the formation of molecular orbital's. Molecular orbital energy level diagrams of diatomic molecules -, N_2 ,O_2 and F_2. Introduction to coordination compounds-ligand-coordination number (CN) - spectrochemical series. Salient features of crystal field theory, Crystal field splitting of transition metal complexes in octahedral (CoF_6^{3-} and $Co(CN)_6^{3-}$) and tetrahedral ($NiCl_4^{2-}$ and $Ni(CN)_4^{2-}$) fields - magnetic properties of complexes. Band structure of solids and effect of doping on conductance.

Module III: Electrochemistry and Corrosion **16 Periods**

A. Electrochemistry:

Introduction to Electrochemistry-Conductance (Specific and Equivalent) and units. Types of cells-electrolytic & electrochemical cells (Galvanic Cells)-Electrode potential- cell potential (EMF).Electrochemical series and its applications, Nernst equation its

applications and numerical problems. Reference electrodes - Calomel Electrode, Quinhydrone electrode and Glass electrode-determination of pH using glass electrode. Batteries: Primary (dry cells) and secondary (Lead-Acid cell, Ni-Cd cell) - applications of batteries. Fuel cells: Hydrogen - Oxygen fuel cell and its applications.

B. Corrosion:

Causes and effects of corrosion: Theories of corrosion - Chemical & Electrochemical corrosion, Pilling-Bedworth rule, Types of corrosion: Galvanic and Water-line corrosion. Factors affecting rate of corrosion-Nature of metal and Nature of Environment, Corrosion control methods - Cathodic protection (Sacrificial anodic and impressed current cathodic methods). Surface coatings: Methods of metallic coatings - hot dipping (Galvanization), Electroplating (Copper) and Electroless plating (Nickel).

Module IV: Stereochemistry & NMR Spectroscopy: 12 Periods

Introduction to Isomers - classification of isomers - structural (chain, positional & functional) and stereoisomerism-geometrical (cis-trans & E-Z system) - characteristics of geometrical isomerism, optical isomerism (chirality - optical activity, specific rotation, enantiomers and diastereomers) of tartaric acid and lactic acid. Conformational isomerism of n-Butane. Introduction to Spectroscopy, Basic concepts of nuclear magnetic resonance spectroscopy, chemical shift, spin-spin splitting, coupling constant in 2-butene.

Module V: Reaction mechanism and synthesis of drug molecules 12 Periods

Introduction to bond cleavage (homo & hetero cleavage) - reaction intermediates and their stability. Types of organic reactions - Mechanism of substitution (SN^1 & SN^2) - addition (Ad_E) -elimination (E_1&E_2) reactions with suitable example. Ring opening (Beckmann rearrangement-preparation of Nylon-6), oxidation and reduction (Cannizaro reaction), cyclization (Components of Diels-Alder reaction-Mechanism of Diels-Alder reaction with suitable example) reactions. Synthesis of Paracetamol, Ibuprofen and their applications.

Text Books

1. P.C.Jain and Monica Jain, "**A Text Book of Engineering Chemistry"**, DhanpatRai Publications, New Delhi, 16th Edition 2014.
2. S.S. Dara and S.S. Umare, "**A Text Book of Engineering Chemistry"**, S Chand Publications, New Delhi, 12th Edition 2010.
3. A.Jaya Shree, "Text book of Engineering Chemistry", Wiley, New Delhi, 2018.

References

1 B.Rama Devi, Ch.VenkataRamana Reddy and PrasanthaRath, **"Text Book of Engineering chemistry"**, Cengage Learning India Pvt.Ltd,2016.

2 M.G. Fontana and N. D. Greene, "**Corrosion Engineering"**, McGraw Hill Publications, New York, 3rd Edition, 1996.

3 K. P. C. Volhardt and N. E. Schore, **"Organic Chemistry: Structure and Function"**, 5th Edition, 2006.

E-Resources:

1. https://books.google.co.in/books?isbn=0070669325 (Engineering chemistry by Sivasankar).
2. https://archive.org/stream/VollhardtOrganicChemistryStructureFunction6th/Vollhardt_Organic_Chemistry_Structure_Function_6th_djvu.txt.
3. http://americanhistory.si.edu/fuelcells/sources.htm (Fuel Cell Information Sources)
4. https://www.abctlc.com/downloads/courses/WaterChemistry.pdf (Water Chemistry)
5. nptel.ac.in/courses/113108051/ (corrosion & electrochemistry web course)

Course Outcomes:

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

1. Understand water treatment, specifically hardness of water and purification of water by various methods.
2. Acquire knowledge on electrochemical cells, fuel cells, batteries and their applications.
3. Analyze microscopic chemistry in terms of atomic and molecular orbital's splitting and band theory related to conductivity.
4. Acquire basic knowledge on the concepts of stereochemistry.
5. Acquire basic knowledge on chemical reaction mechanisms and that are used in the synthesis of molecules.

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**	**3**	**1**	**2**									
CO2	**3**	**2**	**1**	**1**											
CO3	**3**	**3**	**1**	**3**	**1**	**2**	**1**	**1**	**1**						
CO4	**1**		**1**		**1**	**1**		**1**							
CO5	**3**	**3**	**3**	**2**	**2**	**1**	**1**		**1**						

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 80201	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives: To introduce the concept of electrical circuits and its components. To introduce the characteristics of various electronic devices. To impart the knowledge of various configurations, characteristics and applications of electrical & electronic components.

Module I: DC Circuits **9 Periods**

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws - Series, parallel, series-parallel, star-to-delta and delta-to-star transformation- analysis of simple circuits with dc excitation. Superposition, Thevenin's and Maximum Power Transfer Theorems with DC excitation.

Module II: AC Circuits **9 Periods**

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel).

Module III: Introduction to Electrical Machines **10 Periods**

A: DC Machines : Construction & Principle of Operation of DC Generators – E.M.F Equation. Principle of operation DC Motors – Back E.M.F. - Torque equation – Brake Test -Characteristics.

B: AC Machines: Construction and Principle of operation of Transformer- EMF Equation. Construction and Principle of Operation of 3 Phase Induction Motors - Brake test on 3-Phase Induction Motor – Applications.

Module IV: P-N Junction Diode **10 Periods**

P-N Junction Diode: Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances. Zener diode operation, Zener diode as voltage regulator.

Rectifiers : P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier.

Filters : Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

Module V: BJT and Junction Field Effect Transistor (JFET) **10 Periods**

Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Symbol, Amplifying Action, Common Emitter, Common Base and Common Collector configurations and Input-Output Characteristics, Comparison of CE, CB and CC configurations

Junction Field Effect Transistor and MOSFET: Construction, Principle of Operation, Symbol, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET.

Text Books

1. M.Surya Kalavathi, Ramana Pilla, Ch. Srinivasa Rao, Gulinindala Suresh, **" Basic Electrical and Electronics Engineering"**, S.Chand and Company Limited, New Delhi, 1st Edition, 2017.
2. R.L.Boylestad and Louis Nashlesky, **"Electronic Devices & Circuit Theory"**, Pearson Education, 2007.

References

1. V.K. Mehtha and Rohit Mehta, **"Principles of Electrical Engineering and Electronics"**, S.Chand & Co., 2009.
2. Jacob Milliman, Christos C .Halkias, Satyabrata Jit (2011), **"Electronic Devices and Circuits"**, 3 rd edition, Tata McGraw Hill, New Delhi.
3. Thomas L. Floyd and R. P. Jain, "**Digital Fundamentals"**, Pearson Education, 2009.
4. David A. Bell, **"Electronic Devices and Circuits"**, Oxford University Press, 2008.
5. Nagrath I.J. and D. P. Kothari, "**Basic Electrical Engineering"**, Tata McGraw Hill, 2001.
6. Mittle N., **"Basic Electrical Engineering"**, Tata McGraw Hill Education, New Delhi, 2nd Edition, 2005.

E - Resources

1. https://www.electrical4u.com/ohms-law-equation-formula-and-limitation-of-ohms-law/
2. https://www.eeweb.com/passives
3. http://nptel.ac.in/courses/108108076/
4. http://nptel.ac.in/downloads/108105053/

Course Outcomes:

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

1. Apply basic laws in electrical circuit.
2. Analyze the single phase circuits.
3. Comprehend the construction and Operation of DC and AC machines.
4. Know the practical importance of Diode and its characteristics.
5. Recognize the construction and operation of BJT and JFET.

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			
CO2	3	3	3									3			
CO3	3	3	3									3			
CO4	3	3	3									3			
CO5	3	3	3									3			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 80503	DATA STRUCTURES (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: 3		3	-	-

Prerequisites: Computer 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.

MODULE I: Performance Analysis and Introduction to data structures 10 Periods

Performance Analysis: Algorithm definition and characteristics, time and space complexity, Asymptotic Notations – Big O, Omega and Theta notations.

Introduction to data structures: Types of data structures: Linear and Non-linear data structures. Recursion definition- Linear and Binary recursion, Design methodology and implementation of recursive algorithms, Recursive algorithms for Towers of Hanoi.

MODULE II: Linked Lists 9 Periods

Single Linked Lists: Definition, Operations-Insertion, Deletion and Searching, Concatenating single linked lists, Circular linked lists, Operations- Insertion, Deletion.

Double Linked Lists: Definition, Operations- Insertion, Deletion. Applications of Linked list. Sparse matrices - Array and linked representations.

MODULE III: Stacks and Queues 10 Periods

A: Stacks - Basic stack operations, Representation of a stack using arrays and linked lists, Stack Applications - Reversing list, factorial calculation, postfix expression evaluation, infix-to-postfix conversion.

B: Queues - Basic queue operations, Representation of a queue using array and Linked list, Classification and implementation – Circular, Enqueue and Dequeue, Applications of Queues.

MODULE IV: Trees and Graphs 10 Periods

Trees: Basic concepts of Trees, Binary Tree: Properties, Representation of binary tree using array and linked lists, operations on a binary tree, binary tree traversals, creation of binary tree from in, pre and post-order traversals, Tree traversals using stack, Threaded binary tree.

Graphs: Basic concepts of Graphs, Representation of Graphs using Linked list and Adjacency matrix, Graph algorithms, Graph traversals- (BFS & DFS).

MODULE V: Search Trees 9 Periods

Binary Search Trees and AVL Trees: Binary Search Tree, Definition, Operations - Searching, Insertion and Deletion, AVL Trees (Elementary treatment-only Definitions and Examples).

B-Trees and Red-Black Trees: B-Trees, Red-Black and Splay Trees (Elementary treatment-only Definitions and Examples), Comparison of Search Trees.

Text Books

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.

E-Resources

1. http://gvpcse.azurewebsites.net/pdf/data.pdf
2. http://www.sncwgs.ac.in/wp-content/uploads/2015/11/Fundamental-Data-Structures.pdf
3. http://www.learnerstv.com/Free-Computer-Science-Video-lectures-ltv247-Page1.htm
4. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7-3lcmoMApVUMmjlExpIb1zste4YXX1pSpX8a2mLgDzZ-E41CJ6PVmY4S0MqVbxsFQ
5. http://nptel.ac.in/courses/106102064/1

Course Outcomes:

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

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

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	3	2												
CO2	2	2	3												
CO3		2	2												
CO4		2	3												
CO5	2	3	3												

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 80301	ENGINEERING GRAPHICS	L	T	P
Credits: 2	(Common for EEE, ECE, CSE and IT)	1	-	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, Curves and Projection of Points **10 Periods**

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance. Lettering and dimensioning. Geometrical Constructions: Regular polygons only.

Curves: Conic Sections - eccentricity method. Cycloid and Involutes.

Projection of Points: Principles of Orthographic Projections – Conventions – First and Third Angle projections. Projection of points including all four quadrants.

MODULE II: Projection of Lines & Planes **10 Periods**

Projection of Lines: Projection of Lines - parallel, perpendicular, inclined to one reference plane and inclined to both reference planes. True length and true angle of a line.

Projection of Planes: Projection of Planes - Axis inclined to one reference plane.

MODULE III: Projection of Solids & Section of Solids **10 Periods**

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

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

MODULE IV: Development of Surfaces & Isometric Projections **9 Periods**

Development of Surfaces: Development of lateral surfaces of simple Solids.

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

MODULE V: Transformation of Projections **9 Periods**

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

Text Books

1. K.L.Narayana, S.Bheemanjaneyulu "**Engineering Drawing with Auto CAD-2016**" New Age International Publishers, 1st Edition, 2018.
2. N.D. Bhat, "**Engineering Drawing**", Charotar Publishing House, 53rd Edition, 2014.

References

1. K.L.Narayana, P.Kannaiah, "**Engineering Drawing**", SciTech Publishers. 2nd Edition, 2017
2. K.Venugopal,"**Engineering Drawing**",NewAge International Publishers, 3rd Edition,

2014.
3. K. V. Natarajan, "**A text book of Engineering Graphics**", Dhanalakshmi Publishers, 2015.
4. M.S. Kumar, "**Engineering Graphics**", D.D. Publications, 2011.
5. Trymbaka Murthy, "**Computer Aided Engineering Drawing**", I.K. international Publishing House, 3rd Edition, 2011.

E - Resources

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

Course Outcomes

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

1. Understand the basics of drawings and importance of curves.
2. Draw the projection of lines and planes.
3. Draw the projection of solids and section of solids.
4. Produce development of surface and isometric projections.
5. Convert orthographic views to isometric views and vice-versa.

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		1							3		3			
CO2	3		1							3		3			
CO3	3		1							3		3			
CO4	3		1							3		3			
CO5	3		1							3		3			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 80B05	ENGINEERING CHEMISTRY LAB (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: 1		-	-	2

Course Objectives:

To provide the students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.

List of Experiments:

1. Calibration of Volumetric apparatus.
2. Estimation of Total Hardness of water by EDTA Method.
3. Estimation of pH of an acid (Three methods).
4. Estimation of alkalinity of water.
5. Estimation of strength of an acid by Conductometry.
6. Estimation of strength of an acid by Potentiometry.
7. Estimation of Mn^{+2} ion in $KMnO_4$ by Colorimetry.
8. Determination of viscosity of given liquids by Ostwald's viscometer.
9. Determination of surface tension of given sample using stalagmometer.
10. Estimation of iron (II) by dichrometry.
11. Determination of rate constant of hydrolysis of methyl acetate.
12. Preparation of Aspirin.

Course outcomes:

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

1. Estimate the hardness of given water samples.
2. Select lubricants for various purposes.
3. Prepare advanced polymers & drug materials.
4. Know the strength of an acid present in batteries.
5. Calculate the amount of Mn^{+2} present in unknown substances/ores using instrumental methods.

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	1											
CO2	2	1	2												
CO3	2	2		1											
CO4	2	2	1												
CO5	2	1	2												

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 80202	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: 1		-	-	2

Course Objectives: To get practical knowledge about basic electrical circuits, electronic devices like Diodes, BJT, JFET and also analyze the performance of DC Motors, AC Motors and Transformers.

List of Experiments:

1. Verification of Kirchhoff's Laws.
2. Verification of Maximum Power Transfer Theorem.
3. Determination of Phase Angle for RC series circuit.
4. Brake Test on DC-Shunt Motor. Determination of Performance curves
5. Load Tests on Single Phase Transformer
6. Brake Test on Three Phase Induction Motors. Determination of Performance curves
7. V-I Characteristics of PN junction Diode
8. V-I Characteristics of Zener Diode
9. Half Wave Rectifier and Full Wave rectifier.
10. Input and Output characteristics of BJT with CE configuration
11. Input and Output characteristics of BJT with CB configuration
12. Input and Output Characteristics of JFET.

Course Outcomes:

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

1. Analyze electrical circuits by applying basic laws
2. Analyze the performance of DC Motor, three phase Induction motor and transformer
3. Understand V-I Characteristics of various diodes
4. Design Different Rectifier Circuits
5. Differentiate the Transistors and their Operations

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			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 80302	**ENGINEERING GRAPHICS LAB**	**L**	**T**	**P**
Credits: 1	(Common for EEE, ECE, CSE and IT)	**-**	**-**	**2**

Course Objectives:

To develop student's skill in Computer graphics for communicating the concepts and ideas in Engineering products by using drafting software.

List of Exercises

Any 12 exercises out of fourteen should be done by using drafting software

1. Drawing of basic drawing elements and Regular polygons.
2. Drafting projections of lines- parallel, perpendicular, inclined to one reference plane.
3. Drafting projections of lines - inclined to both reference planes.
4. Drafting projections of lines inclined to both reference planes - obtaining true length.
5. Drafting Projections of planes – Surface inclined to one reference plane.
6. Drafting of regular solids - cube, prism, pyramid, cylinder and cone.
7. Drafting projection of solids inclined to one plane.
8. Drafting projection of section of solids - cutting plane inclined to one plane.
9. Drafting development of surface of regular solids - prism
10. Drafting development of surface of regular solids - cylinder, cone
11. Drafting Isometric Projection – Isometric Views- Plane Figures
12. Drafting Isometric Projection – Isometric Views- Simple Solids.
13. Conversion of Isometric Views to Orthographic Views.
14. Conversion of Orthographic Views to Isometric Views.

Course Outcomes:

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

1. Draft basic drawings elements.
2. Draw the projection of points, lines and planes on Cartesian coordinates using drafting software.
3. Draw the projection solids on Cartesian coordinates using drafting software.
4. Develop surfaces of regular solids, sectional solids and solids inclined to one axis using drafting software.
5. Convert and develop the isometric views on to orthographic projections using drafting software.

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		1		3				2	3		2			
CO2	3		1		3				2	3		2			
CO3	3		1		3				2	3		2			
CO4	3		1		3				2	3		2			
CO5	3		1		3				2	3		2			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 80504	**DATA STRUCTURES LAB** (Common for EEE, ECE, CSE and IT)	**L**	**T**	**P**
Credits: 1		**-**	**-**	**2**

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

List of Programs:

1 Write a recursive program to solve Towers of Hanoi problem - N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.
2 Write a program to create a single linked list, with the following operations:
   a) Insertion
   b) Deletion
   c) Display the elements
   d) Count no of elements.
3 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.
4 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.
5 Write a program to implements stack operations using:
   a) Arrays
   b) Linked list
6 Write a program to:
   a) Evaluate Postfix expression.
   b) Convert infix expression into postfix expression
7 Write a program to implements Linear Queue operations using:
   a) Arrays
   b) Linked list
8 Write a program to implements Circular Queue operations using Arrays
9 Write a program to implements Double-ended Queue operations using:
   a) Arrays
   b) Double Linked List

10 Write a recursive program to create a Binary Tree of integers, traverse the tree in preorder, in order and post order and also print the number of leaf nodes and height of the tree.

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

12 Write a program for implementing the following graph traversal algorithms:
a) Breadth First Search (BFS)
b) Depth First Search (DFS)

Text Books

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 (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**	**3**	**2**												
CO2	**2**	**2**	**3**												
CO3		**2**	**3**												
CO4		**2**	**3**												

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. II Semester		
Code: 80A01	NSS / SPORTS / YOGA	L	T	P
Credits: NIL	(Common for EEE, ECE, CSE and IT)	-	-	3

Prerequisites: NIL

Course Objectives: To develop physical skills and fitness specific to a particular sport. Provide them the training and coaching towards achieving their group goals. To give the students health and physical fitness to ensure mental and emotional balance. NSS (**National Service Scheme)** provides ample opportunities for the students to participate in the community service programs. To encourage them to become socially and environmentally sensitive, empathetic and responsible individuals of the nation.

MODULE-I **6 Periods**

Introduction and Basic concepts of NSS: History, Philosophy, aims & Objectives of NSS, Emblem, Motto, Song and Other Components of NSS, **NSS Programmes and Activities- Concept of regular activities,** Special camping, Day camps. Basis of adoption of villages/ slums & methodology of survey.

MODULE-II **6 Periods**

Volunteerism and Shramdan- needs &Importance of Volunteerism, Motivation and Constraints of Volunteerism, Shramdan as a part of Volunteerism.

MODULE-III **6 Periods**

Introduction of physical education: Importance of physical education, Athletics (Track events and combined events), Basket ball, Throw ball, Foot ball.

MODULE-IV **6 Periods**

Youth and yoga- yoga as a tool for healthy lifestyle, Yoga as a preventive, promotive& curative method. Pranayam and Different Yoga traditions and their impacts.

Various competitions at different levels- Athletics (field events), volleyball, handball, cricket. Indoor games: Table Tennis, Caroms, chess

MODULE-V **6 Periods**

Environmental Issues- Natural Resource Management (Rain water Harvesting, energy conservation etc.). Waste Management, Disaster Management- Role of youth in Disaster Management.

Civil / Self Defense- Aims and objectives of Civil defense and need for self-defense training.

Text Books:

1. Christopher G. Petre, **"Social Work with Children and Their Families: Pragmatic Foundations "**, Journal Vol:24, No.3, September 18th, 2003, 2nd Edition.

References

1. Pamela Grundy & Susan Shackleford, "**Shattering the Glass: The Remarkable History of Women in Basketball**" Published 15th May, 2007.
2. Roger Kahn, "The **Boys of Summer**", 1st Edition, May 9th 1973.
3. Jaci Burton, "**Perfect Play"**, 1st Edition, Feb 1st 2011, series 1.
4. Silva Mehta, Mira Mehta and Shyam Mehta, **"Yoga: The Iyengar Way",** Published by Knopp, 7th April, 1990.
5. Vishnu-Devananda, **"The Complete Illustrated Book of Yoga",** 18th April, 1995.
6. Timothy McCall, **"Yoga as Medicine: The Yogic Prescription for Health and Healing",** published by Harmony, 31st July 2007.
7. Rashmi Bansal, "**Stay Hungry Stay Foolish",** 1st December 2008.
8. Beverly Schwartz, "**Rippling: How Social Entrepreneurs Spread Innovation Throughout the World"**, Published by Jossey – Bass, May 27th 2012.

E-Resources:

1. http://nptel.ac.in/courses/109106059/11
2. http://nptel.ac.in/courses/109106059/12
3. http://nptel.ac.in/courses/109106059/13
4. http://nptel.ac.in/courses/109106059/14

Course Outcomes

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

1. Understand the concepts of National Service Scheme (NSS) and its activities.
2. Gain the essence of volunteerism and shramdan
3. Understand the rules and procedures of physical education and its events.
4. Learn the basics of yoga and its benefits to the youth in personality development.
5. Gain the knowledge of managing the environmental issues and self-defense activities.

CO- PO, PSO 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		2	2			
CO2						2		2	2			
CO3						2		2	2			
CO4						2		2	2			
CO5						2		2	2			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 80B10	SPECIAL FUNCTIONS AND COMPLEX VARIABLES (Common for EEE & ECE)	L	T	P
Credits: 3		3	-	-

Prerequisite: Complex Numbers, Differentiation and Integration

Course Objectives:

The objective of this course is to familiarize the students, in some detail, about the analysis on Special Function s & Complex Number field. The central idea of analytic functions and the various series and transformations will find ready application in many branches of engineering.

Module - I: Series Solution to the differential equations **9 Periods**

Motivation for series solution, Ordinary point and Regular singular point of a differential equation, Series solutions to differential equations around zero, Frobenius Method about zero.

Module - II: Legendre's & Bessel's Polynomials **10 Periods**

Legendre's Differential equation, General solution of Legendre's equation, Legendre's Polynomials & Recurrence relations, Generating function, orthogonality, related problems Bessel's Differential equation, General solution of Bessel's equation, Bessel functions, Recurrence relations, Generating function, and orthogonality, related problems.

Module - III: Complex Functions –Differentiation and Integration **10 Periods**

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

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

Module - IV: Power series expansions of complex functions and contour Integration **10 Periods**

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. Residue – Evaluation of residue by formula and by Laurent series – Residue theorem. Evaluation of integrals by indentation (a) $\int_c^{c+2\pi} f(\cos\theta \ , \sin\theta)d\theta$ (b) $\int_{-\infty}^{\infty} f(x)dx$

Module - V: Conformal mapping **9 Periods**

Transformation of z-plane to w-plane by a function, conformal mapping. Standard transformations, Translation; Magnification and rotation; inversion and reflection, Transformations like e^Z, log z, z^2

Bilinear transformation, Properties of Bilinear transformation, determination of bilinear transformation when mappings of 3 points are given.

Text Books:

1. Erwin Kreyszig, **Advanced Engineering Mathematics**, 9th Edit ion, John Wiley & Sons, 2006.
2. Murray R Spiegel, **Complex variables**, Schaum's Outlines, 2nd Edition, Mc.Graw Hill Publications.
3. J N Sharma, **Functions of a complex variable**, Krishna Publications.

References

1. Michel D Greenberg, Advanced Engineering Mathematics, Second Edition, Pearson Publications.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. R.K.Jain, S.R.K.Iyengar, Advanced Engineering Mathematics, 5th edition, Narosa Publications

E-Resources

1. http://www.math.odu.edu/~jhh/ch25.PDF (Function Of Complex Variable)
2. https://www.math.ust.hk/~maykwok/courses/ma304/06_07/Complex_4.pdf (Complex Integration)
3. http://www.math.psu.edu/papikian/Kreh.pdf (Bessel Function)
4. http://nptel.ac.in/courses/111103070/10 (Cauchy-Riemann Equations and Differentiability)
5. http://nptel.ac.in/courses/111103070/16 (Contour Integration)
6. http://nptel.ac.in/courses/111103070/32 (Conformal mapping)

Course Outcomes:

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

1. Evaluate the improper integrals using Beta and Gamma functions.
2. Understand the Bessel's and Legendre's Polynomials.
3. Understand the concept of Analytic function and conformal mapping.
4. Understand the concept of Complex integration.
5. Understand the concepts of Laurent's series, Taylor series expansions of complex functions and Contour integration.

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**	**3**	**3**	**1**				**2**			**1**			
CO2	**3**	**2**	**2**	**2**	**2**		**3**		**1**	**3**		**1**			
CO3	**3**	**2**	**2**	**3**	**2**	**3**	**2**		**2**	**3**		**2**			
CO4	**3**	**2**	**2**	**2**	**1**			**2**	**3**	**3**		**2**			
CO5	**3**	**2**	**2**	**2**				**3**		**3**		**2**			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 80401	**ANALOG ELECTRONICS**	**L**	**T**	**P**
Credits: 3	(Common for EEE & ECE)	**3**	**-**	**-**

Prerequisites: Applied Physics, Basic Electrical and Electronic Engineering

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

MODULE I 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 Ico, VBE 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 II 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. Comparison of transistor configurations in terms of Ai, Ri, Av, Ro. Analysis of CE Amplifier with Emitter resistance and Emitter follower , Millers theorem and its Dual. Simplified h-parameter Model.

MODULE III Single Stage Amplifiers 10 Periods

A: Classification of Amplifiers, Distortion in Amplifiers, Low Frequency response of common emitter Amplifiers, Common Base Amplifiers and Common Collector Amplifier.

B: Small signal JFET model, JFET Amplifiers: Common Drain Amplifier, Common Source Amplifier and Common Gate Amplifier. Gain band width product. Analysis of Common Source Amplifier with resistive load.

MODULE IV Feedback Amplifiers 8 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. Design

of an RC Phase - Shift Oscillator.

Text Books

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

References

1. Robert Boylestad, LowisNashelsky, "Electronic Devices and Circuit Theory", Prentice Hall of India, 5th Edition, 1993.
2. David. A. Bell, "Electronic Devices and Circuits", Prentice Hall of India, 4th Edition, 1986.
3. G. K. Mithal, " Electronic Devices and Circuits", Khanna Publications, 22nd Edition,1999.
4. Theodore. F. Bogart Jr. Jeffrey S. Beasley, Guillermo Rico, "Electronic Devices and Circuits", Pearson Education (India), 6th edition , 2004.

E - Resources

1. http://electronicsforu.com/
2. https://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
6. http://nptel.ac.in/courses/117101106/1
7. http://sureshq.blogspot.in/2015/11/click-bellow-link-to-download-this.html
8. http://www.aiet.edu.eg/FeedbackOscillatorCircuits.pdf
9. http://www.cs.tut.fi/kurssit/TLT-8016/Chapter9.pdf
10. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=4807109
11. http://www.springer.com/engineering/electronics/journal/34
12. http://nptel.ac.in/courses/122106025/1

COURSE OUTCOMES

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

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

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								2	1		1
CO2	3	2	3	3								2	1		1
CO3	3	3	3	3								2	1		1
CO4	3	2	3	3								2	1		1
CO5	3	2	3	3								2	1		1

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 80316	FLUID 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 pipes- 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

Course Outcomes:

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

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.

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			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 80203	ELECTRICAL CIRCUIT ANALYSIS AND SYNTHESIS	L	T	P
Credits: 4		3	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 and Magnetic Circuits 13 Periods

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

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

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 (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**

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 80204	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
(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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 80319	**FLUID MECHANICS AND HYDRAULIC MACHINES LAB** (Common for EEE and Min.E.)	**L**	**T**	**P**
Credits:1.5		**-**	**-**	**2**

Course Objectives: To provide practical knowledge of fluid flow properties, flow losses, performance testing of hydraulic turbines and hydraulic pumps.

List of Experiments

1. Performance test on impact of jet on Vanes.
2. Performance test on Pelton Wheel.
3. Performance test on Francis Turbine.
4. Performance test on Kaplan Turbine.
5. Performance test on Single Stage Centrifugal Pump.
6. Performance test on Multi Stage Centrifugal Pump.
7. Performance test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of minor losses (sudden contraction, expansion, pipe bend and union) for a given pipeline.
12. Validation of Bernoulli's Theorem.

Course Outcomes

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

1. Analyze the performance of turbines.
2. Analyze the performance of centrifugal and reciprocating pump.
3. Analyze the performance of venturimeter and orifice meter.
4. Determine the minor losses in given pipe system.
5. Demonstrate the Bernoulli's equation in Bernoulli's apparatus.

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		3	2	1			3			3			
CO2	3	1		3	2	1			3			3			
CO3	3	1		3	2	1			3			3			
CO4	3	1		3	2	1			3			3			
CO5	3	1		3	2	1			3			3			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 80406	**ANALOG ELECTRONICS LAB** (Common for EEE & ECE)	**L**	**T**	**P**
Credits: 1		**-**	**-**	**2**

Course Objectives:

To design different amplifiers, Feedback amplifiers and Oscillator circuits according to the given specifications.

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

1. Common Source Amplifier.
2. Common Gate Amplifier.
3. Voltage Shunt Feedback Amplifier
4. Wein Bridge Oscillator using Transistors.
5. Hartley Oscillator Using Transistors.
6. Colpitt's Oscillator Using Transistors.

PART - B: To be performed Using Discrete Electronic Components

1. Common Emitter Amplifier.
2. Common Collector Amplifier.
3. Common Drain Amplifier.
4. Voltage Series Amplifier.
5. Current 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 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**	**2**	**1**		**1**
CO2	**3**	**3**	**3**	**3**	**3**		**2**			**1**	**1**	**2**	**1**		**1**
CO3	**3**	**3**	**3**	**3**	**2**		**1**			**1**		**2**	**1**		**1**

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 80205	ELECTRICAL CIRCUITS LAB	L	T	P
Credits: 1.5		-	-	3

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 for the given circuit.
2. Verification of maximum Power Transfer Theorem for Excitation for the Given 'T' Network.
3. Verification of Super Position Theorem for given electrical Network.
4. Verification of Compensation Theorem for DC Excitation for the given 'T' Network.
5. Verification of Reciprocity Theorem for DC Excitation for the given electrical Network.
6. Experimental determination of Quality Factor, Bandwidth and resonant frequency for the given Series & Parallel RLC Circuit.
7. Experimental Determination of Z & Y Parameters for the given 'T' network.
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
(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

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. III Semester		
Code: 80M02	**GENDER SENSITIZATION**	**L**	**T**	**P**
Credits: NIL	(Common for EEE, ECE, CSE and IT)	**2**	**-**	**-**

Course Objectives:

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.

MODULE -I:- UNDERSTANDING GENDER **6 Periods**

Gender: Why Should We Study It? *(Towards a World of Equals:* Unit -1) Socialization: Making Women, Making Men *(Towards a World of Equals:* Unit -2) Introduction. Preparing for Womanhood. Growing up Male. First Lessons in Caste. Different Masculinities.

Just Relationships: Being Together as Equals *(Towards* a *World of Equals:* Unit *-2)* Mary iKorn and Onler. Love and Acid just do not Mix. Love Letters. Mothers aniJ Fathers. Further Reading: Rosa Parks-The Brave Heart.

MODULE -II:- GENDER AND BIOLOGY **6 Periods**

Missing Women: Sex Selection and Its Consequences *(Towards a World of Equals:* Unit -4) Declining Sex Ratio. Demographic Consequences.

Gender Spectrum: Beyond the Binary *(Towards* a *World of Equals:* Unit -10)

Two or Many? Struggles with Discrimination.

Additional Reading: Our Bodies, Our Health *(Towards a World of Equals:* Unit -13)

MODULE -III:- GENDER AND LABOUR **7 Periods**

A: Housework: the Invisible Labour *(Towards a World* of *Equals:* Unit -3)

"My Mother doesn't Work." "Share the Load."

B: Women's Work: Its Politics and Economics *(Towards a World of Equals:* Unit -7)

Fact and Fiction. Unrecognized and Unaccounted work. Further Reading: Wages and Conditions of Work.

MODULE -IV:- ISSUES OF VIOLENCE **7 Periods**

Sexual Harassment: Say Nol *(Towards a World of Equals:* Unit -6)

Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: *"Chdpulum.* Domestic Violence: Speaking Out *(Towards a World of Equals:* Unit -5)

Is Home a Safe Place? When Women Unite (Film" Rebuilding Lives. Further Reading: New Forums for Justice. Thinking about Sexual Violence *(Towards a World of Equals:* Unit -11)

Blaming the Victim-1 Fought for my Life...." - Further Reading: The Caste Face of Violence.

MODULE -V:- GENDER STUDIES **6 Periods**

Knowledge: Through the Lens of Gender *(Towards a Work/ of Equals:* Unit -5)
Point of View. Gender and the Structure of Knowledge. Further Reading: Unacknowledged Women Artists of Telangana.
Whose History? Questions for Historians and Others *(Towards a World of Equals:* Unit -9)
Reclaiming a Past. Writing other Histories. Further Reading: Missing Pages from Modern Telangana History.

Essential Reading: All the Units In the Textbook, *"Towards a World of Equals: A Bilingual Textbook on Gender"* written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Mina Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Thant

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.

Text Books

1. A Suneetha et al., Towards a World of Equals: A bilingual Textbook on Gender

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. Tripti Lahiri. "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?Flook Cndet,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 history ....' 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 of the course, students will be able to:

1. Develop a better understanding of important issues related to gender in contemporary India.
2. Sensitize about the basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Acquire insight into the gendered division of labour and its relation to politics and economics.
5. Develop a sense of appreciation of women in all walks of life.

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**			
CO2						**3**		**3**	**3**		**2**	**3**			
CO3						**3**		**3**	**3**		**2**	**3**			
CO4						**3**		**3**	**3**		**2**	**3**			
CO5						**3**		**3**	**3**		**2**	**3**			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. III Semester		
Code: 80A02	INTERNSHIP - I	L	T	P
Credits: Nil		-	-	-

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech IV Semester		
Code:80H04	ENGINEERING ECONOMICS AND ACCOUNTANCY (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
(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			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: 80206	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 C**apacitance measurement** – De-Sauty's bridge, Schering Bridge (LV & HV bridges), Wein's bridge.

MODULE III Instrument Transformers 10 Periods

A: 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

Electronic Voltmeter, Multimeter, Wattmeter & Energy meter. Time, Frequency and phase angle measurements using CRO. Spectrum & Wave analyzer. Digital counter, frequency meter and storage oscilloscope.

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 should 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
(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

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: 80207	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 decreasing the effects of armature reaction – Compensating winding – Commutation – Methods of improving commutation. OCC - Voltage build up in generators - 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: 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 - Effect of frequency & supply voltage on core losses. OC and SC tests - Sumpner's test - Predetermination of efficiency and regulation - 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 (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**

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: 80208	POWER GENERATION AND DISTRIBUTION	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: Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses. Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and Cooling towers.

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

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

MODULE II Hydroelectric Power Stations and Turbines 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.

Hydraulic Turbines: Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine - Working proportions, work done, efficiencies, hydraulic design - Draft tube theory - Functions and efficiency.

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 - 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
(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	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	

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: 80209	CONTROL SYSTEMS (Common for EEE & ECE)	L	T	P
Credits: 3		3	-	-

Prerequisites: Engineering Mathematics – I .

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 Introduction 10 Periods

Concepts of Control Systems - Open Loop and closed loop control systems and their differences -Different examples of control systems - Classification of control systems, Feedback Characteristics, Effects of feedback, Mathematical models – Differential equations, Impulse Response and transfer functions.

Transfer Function Representation: Block diagram representation of systems considering electrical systems as examples - Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

Synchros, AC & DC servo motors and stepper motor.

MODULE II Time Response Analysis 9 Periods

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

MODULE III Stability Analysis in S-Domain 9 Periods

A: The concept of stability – Routh's stability criterion – Qualitative stability and conditional stability – Limitations of Routh's stability.

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

MODULE IV Frequency Response Analysis 10 Periods

Introduction, Frequency domain specifications - Bode diagrams - Determination of frequency domain specifications and Phase margin and Gain margin - Stability analysis from Bode Plots - Polar Plots - Nyquist Plots.

Compensation Techniques: Lag, Lead and Lead -Lag Controllers design in frequency Domain**.**

MODULE V State Space Analysis of Continuous Systems 10 Periods

Concepts of state, state variables and state model, 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.Nagoor kani, "**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 (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**

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: 80210	ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LAB	L	T	P
Credits: 1		-	-	2

Course Objectives:

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.

List of Experiments:

1. Calibration and Testing of single phase energy Meter.
2. Calibration of dynamometer power factor meter.
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 Anderson Bridge & Maxwell's Bridge.
7. Measurement of 3 phases reactive power with single wattmeter.
8. Measurement of choke coil parameters using 3 voltmeter and 3 ammeter method.
9. Calibration of LPF wattmeter by Phantom Loading.
10. Measurement of 3 phases power with single wattmeter and Two Watt Meter method.
11. Calibration of single phase energy Meter by Phantom Loading.
12. Measurement of Strain by using Resistance strain gauge.

Course Outcomes

At the end of the course, students should 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
(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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: 80211	DC MACHINES AND TRANSFORMERS LAB	L	T	P
Credits: 1.5		-	-	3

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. Determination of characteristics.
3. Load test on DC series generator. Determination of characteristics.
4. Load test on DC compound generator. Determination of characteristics.
5. Hopkinson's test on DC shunts machines. Predetermination of efficiency.
6. Fields test on DC series machines. Determination of efficiency.
7. Swinburne's test and speed control of DC shunt motor. Predetermination of efficiencies.
8. Brake test on DC compound motor. Determination of performance curves.
9. Brake test on DC shunt motor. Determination of performance curves.
10. Retardation test on DC shunt motor. Determination of losses at rated speed.
11. Separations of losses in DC shunt motor.
12. Brake test on DC series motor. Determination of performance curves.

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
(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			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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. IV Semester		
Code: 80212	CONTROL SYSTEMS LAB	L	T	P
Credits: 1.5		-	-	3

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 verificat ion 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 systems
7. Lag and lead compensation – Magnitude and phase plot.
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 (Bode, Root Locus, 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 should 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
(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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech IV Semester		
Code: 80M01	**ENVIRONMENTAL SCIENCE** (Common for EEE, ECE, CSE and IT)	**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, food webs and ecological pyramids. Flow of energy.

Activity: Plantation.

Module II: Natural resources, Biodiversity and Biotic resources:

A: Natural Resources: **5 Periods**

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 renewable energy sources.

B: Biodiversity and Biotic resources: **4 Periods**

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 III: ENVIRONMENTAL POLLUTION AND CONTROL: **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 house effect, 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

Reference Books:

1. Erach Bharucha,**"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:

After completion 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 (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**							

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80403	DIGITAL ELECTRONICS	L	T	P
Credits: 3		2	1	-

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

Simplification of Boolean functions: Simplification of functions: Karnaughmap (2,3,4,5,6 Variables) and Quine McCluskey method (Tabular Method) - Prime implicants, essential prime implicants.

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

MODULE-V: Sequential Logic Circuits - II **10 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,**"Digital Design"**,PHI, 3rd Edition, 2009.
3. A.Anand Kumar,**"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 (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**

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80213	AC MACHINES	L	T	P
Credits: 4		3	1	-

Prerequisites: Electromagnetic Fields

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 - Construction details - Production of a 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 test – Equivalent circuit – Circle diagram – Induction generator.

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 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 of synchronous motor – 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 constant load – Torque equation – V curve and inverted V curve – 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 https://www.electrical4u.com/induction-motor-types-of-induction-motor/
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
(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

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80214	POWER TRANSMISSION SYSTEMS	L	T	P
Credits: 4		3	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 General Concepts 13 Periods

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

MODULE II Performance of Transmission Lines 13 Periods

Classification of Transmission Lines - Short, Medium and Long Line and Their Exact Equivalent Circuits- Nominal-T, Nominal-Pie. Mathematical Solutions to Estimate Regulation and Efficiency of All Types of Lines. Long Transmission Line-Rigorous Solution, Evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations – Surge Impedance and Surge Impedance Loading - Wavelengths and Velocity of Propagation – Ferranti Effect , Charging Current-Numerical Problems.

MODULE III Mechanical Design of Transmission Lines & Overhead Line Insulators 13 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 Its Applications, Numerical Problems.

MODULE IV Power System Transients & Travelling Waves 13 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 Cables 12 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.

References

1. B.R.Gupta**, "Power System Analysis and Design",** S.Chand & Co, 6th Revised Edition, 2010.
2. I.J.Nagrath and D.P.Kothari , **"Modern Power System Analysis",** Tata McGraw Hill, 3rd Edition, 2008.
3. M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakrabarti, **"A Text Book on Power System Engineering"**, Dhanpat Rai & Co Pvt. Ltd., 2003.
4. S.N. Singh, **"Electric Power Generation, Transmission and Distribution"**, Prentice Hall of India Pvt. Ltd, New Delhi, 2nd Edition, 2011.
5. Luces M.Fualken berry and Walter Coffer, **"Electrical Power Distribution and Transmission"**, Pearson Education, 2007.

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.
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
(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

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80215	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 (SCR's) – BJT – Power MOSFET – Power IGBT and their characteristics Basic theory of operation of SCR – Static and Dynamic characteristics of SCR - Salient points - Two transistor analogy - UJT firing circuit – Series and Parallel connections of SCRs - Snubber circuit details – Specifications and Ratings of SCRs, 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 – Derivation of average load voltage and current - without and with freewheeling Diode – Numerical problems. Single Phase.

Fully Controlled Converters: Midpoint and Bridge connections with R, RL and RLE loads - Derivation of average load voltage and current - Performance parameter 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 connections – Average load voltage with R and RL loads – Numerical Problems.

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

MODULE IV Choppers & AC Voltage Controllers 10 Periods

Choppers: Step-down and step-up chopper-control strategy–Forced commutated chopper–Voltage commutated, Current commutated, Load commutated, 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 resistive, inductive loads - Numerical Problems.

Cyclo Converters: Cyclo converters – Single phase midpoint cyclo converters with Resistive and inductive load (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. Analyze three phase power converter circuits and understand their applications.
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
(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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80222	HIGH VOLTAGE ENGINEERING	L	T	P
Credits: 3	(Professional Elective– I)	3	-	-

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, cable 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 direct current voltages, generation of high alternating voltages, generation of impulse voltages, generation of impulse currents, tripping and control of impulse generators.

B: Measurement of high direct current voltages, measurement of high alternating voltages 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 and bushings, testing of isolators and circuit breakers, testing of cables, testing of transformers, testing of 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 (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**		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80223	GRAPHICAL PROGRAMME AND APPLICATIONS (Professional Elective–I)	L	T	P
Credits: 3		3	-	-

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

A: 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 to pass 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 Y scales 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: Currentloop, 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 ,control system, etc

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

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80224	**ADVANCED CONTROL SYSTEMS**	**L**	**T**	**P**
Credits: 3	(Professional Elective-I)	**3**	**-**	**-**

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 non linear 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 forms.

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**

A: 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. 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.

E - Resources

1. http://www.ieeecss-oll.org/
2. http://ieeecss.org/CSM/library/2011.html
3. http://nptel.ac.in/courses/108103007/

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
(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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80413	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:

1. Introduction to Verilog/VHDL and Design of all the logic gates
2. Design of Half adder, Full adder using 3 modeling styles
3. Design of Half Subtractor, Full Subtractor using 3 modeling styles
4. Design of 4X16 Decoder using two 3x8 Decoders
5. Design of 8-to-3 encoder (without and with priority).
6. Design of Multiplexer &Demultiplexer.
7. Design of comparator
8. Design of 4-bit binary to gray converter viceversa,
9. Design of BCD to Excess-3 code converter and viceversa
10. Design of flip flops: SR, D, JK, T.
11. Design of 4-bit binary up/down counter.
12. 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.

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

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80216	AC MACHINES LAB	L	T	P
Credits: 1.5		-	-	3

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 a 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 a 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 of a three-phase alternator.

Course Outcomes

At the end of the course, students should 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
(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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80217	POWER ELECTRONICS LAB	L	T	P
Credits: 1.5		-	-	3

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 load.
10. Three Phase half controlled bridge converter with R-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
(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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. V Semester		
Code:80M04	INDIAN CONSTITUTION (Common for EEE, ECE, CSE and IT)	L	T	P
Credits: Nil		2	-	-

Prerequisites: NIL

Course Objective: To understand the importance Indian Constitution, administration, concept and development of human rights, election commission.

MODULE-I **6 Periods**

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution- Sources and constitutional history, Features- Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy

MODULE-II **7 Periods**

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions; **State Government and its Administration** Governor: Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

MODULE-III **6 Periods**

A.Local Administration District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation,

B.Pachayati Raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

MODULE-IV **7 Periods**

Concept and Development of Human Rights: Meaning Scope and Development of Human Rights, United Nations and Human Rights – UNHCR, UDHR 1948, ICCPR 1996 and ICESCR 1966, **Human Rights in India:** Protection of Human Rights Act, 1993 (NHRC and SHRC), First, Second and Third Generation Human Rights, Judicial Activism and Human Rights.

MODULE-V **6 Periods**

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

References

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-Resources:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

Course Outcomes:

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

1. Know the sources, features and principles of Indian Constitution.
2. Learn about Union Government, State government and its administration.
3. Get acquainted with Local administration and Pachayati Raj.
4. Be aware of basic concepts and developments of Human Rights.
5. Gain knowledge on roles and functioning of Election Commission.

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**	**3**							
CO2						**1**	**2**	**3**							
CO3						**1**	**2**	**3**							
CO4						**1**	**2**	**3**							
CO5						**1**	**2**	**3**							

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. V Semester		
Code: 80A03	**INTERNSHIP - II**	**L**	**T**	**P**
Credits: Nil		**-**	**-**	**-**

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 80402	SIGNALS AND SYSTEMS	L	T	P
Credits: 3		2	1	-

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 forcontinuous time domain signals, the concept of Z-transform, its properties and its applications for discrete time domain signals

MODULE-I: 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
7. http://nptel.ac.in/courses/117101055

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
(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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 80414	**MICROPROCESSORS AND MICROCONTROLLERS**	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: Digital Electronics.

Course Objectives:

- To develop an in-depth understanding of the operation of microprocessors and microcontrollers, machine language programming & interfacing techniques.
- To design and develop Microprocessor/ microcontroller based systems for real time applications using low level language like ALP.
- To understand the basics of microprocessors and microcontrollers architectures and its functionalities

MODULE-I: 8085 Architecture **8 Periods**

Introduction to Microprocessors, Architecture of 8085, Pin Configuration and Function, internal register & flag register, Generation of Control Signals: Bus Timings: De-multiplexing of address/ data bus; Fetch Cycle, Execute Cycle, Instruction Cycle, Machine cycles, T-states, memory interfacing.

MODULE-II: Instruction Set and Programming with 8085 **10 Periods**

Instruction for Data Transfer, Arithmetic and Logical Operations, Branching Operation, Machine Cycle Concept, Addressing Modes, Instructions Format, Stacks, Subroutine and Related Instructions, Elementary Concepts of Assemblers, Assembler Directives, Looping and Counting, Software Counters with Time Delays, Simple Programs using Instruction Set of 8085, Debugging, Programs Involving Subroutines, Programs for Code Conversion e.g. BCD to Binary, Binary to BCD, Binary to Seven-Segment LED Display. Binary to ASCII, ASCII to Binary, Program for Addition Subtraction, Programs for Multiplication and Division of Unsigned Binary Numbers.

MODULE-III: 8086 Architecture **9 Periods**

A:8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086- Common Function Signals, Timing diagrams, Interrupts of 8086.

B: Interfacing I/O Devices: Interfacing of 8086 with Memory, key board and display, A/D and D/A.

MODULE-IV: Introduction to Microcontroller **10 Periods**

A brief History of Microcontrollers, Harvard Vs Von-Neumann Architecture; RISC Vs CISC, Classification of MCS-51family based on their features (8051,8052, 8031, 8751, AT89C51), Pin configuration of 8051.

8051 Microcontroller Architecture and Instruction Set: Registers of 8051, Inbuilt RAM, Register banks, stack, on-chip and external program code memory ROM, power

reset and clocking circuits, I/O port structure, addressing modes, Instruction set and programming.

MODULE-V: 8051 Real Time Control **11 Periods**

Counter/Timer and Interrupts of 8051: Introduction, Registers of timer/counter, Different modes of timer/counter, Timer/counter programming, Interrupt *Vs* Polling, Types of interrupts and vector addresses, register used for interrupts initialization, programming of external interrupts, Timer interrupts.

Asynchronous Serial Communication and Programming: Introduction to serial communication, Programming the Serial Communication Interrupts, RS232 standard, RS422 Standard, RS-485 standard, Max 232/233 Driver.

Interfacing with 8051: Interfacing and programming of: ADC (0804,0808/0809,0848) & DAC(0808), dc motor, stepper motor, Relays, LED and Seven segment display, LCD, 4x4 keyboard matrix.

Text Books

1. Ramesh Gaonkar, **Microprocessor Architecture, Programing and Application with 8085,** Penram, 5th Edition, 2002.

2. A.K.Ray, **Advanced Microprocessors and Peripherals**, Tata McGraw-Hill, 3rd Edition

3. Mazidi, Mazidi & McKinlay, **The 8051 Microcontroller and Embedded Systems using Assembly and C**, 2nd Edition, PHI.

References:

1. D. V Hall, **Microprocessors and Interfacing,** TMH, 2nd Edition, 2006.
2. N.K. Srinath, **8085Microprocessor Programming & Interfacing**, PHI ,1st Edition, 2005.
3. K. Uday Kumar, B.S. Umashankar, **The 8085 Microprocessor: Architecture, programming and Interfacing,** Pearson, 2008.
4. Liu and Gibson, **Micro Computer System 8086/8088 Family Architecture, Programming and Design** PHI, 2nd Edition.
5. Rajkamal, **Microcontrollers: Architecture, Programming, Interfacing and System Design**, Pearson Education.
6. Ajay. V. Deshmukh, **Microcontrollers and Application,** TMGH, 2005.
7. Kenneth. J. Ayala, **The 8051 Microcontroller,** Cengage Learning, 3rd Edition, 2004.
8. Manish K Patel , **The 8051 Microcontroller Based Embedded Systems,** McGraw Hill Education , 1st Edition (1 July 2017).

Course Outcome: After Completion of this course the student will able to

1. Analyze organization of popular 8085/8086 microprocessors
2. program the 8085 microprocessor.
3. program the 8086 microprocessor
4. Understand Microcontroller 8051 its architecture, its instruction set,
5. Analyze and program the 8051 Counter/timer and interrupts and serial communication, interfacing 8051 with 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**		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 80218	SWITCHGEAR AND PROTECTION	L	T	P
Credits: 4		3	1	-

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.

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 % Winding Unprotected.

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:** Differential protection.

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.-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"**, 13th Edition, 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 should 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
(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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 80225	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 should 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
(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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 80226	ELECTRICAL MACHINE DESIGN (Professional Elective - II)	L	T	P
Credits: 3		3	-	-

Prerequisite: DC Machines 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 – Maganetic 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 – design of tank and cooling tubes of transformers.

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 Book', New Age International Pvt. Ltd., Reprint, 2007.
2. R.K.Agarwal " Principles of Electrical Machine Design" Esskay Publications, Delhi, 2002.
3. Sen, S.K., 'Principles of Electrical Machine Designs with Computer Programmes', Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 1987.

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 should be able to

1. Calculate the magnetic circuit parameters of electrical machines.
2. Design main dimension of DC machines, AC machines and transformer based on power ratings
3. Design the internal dimensions of various electrical machines.
4. Evaluate the thermal ratings of electrical machines
5. Design the cooling system of electrical machines.

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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 80227	ELECTRICAL ESTIMATION AND COSTING (Professional Elective – II)	L	T	P
Credits: 3		3	-	-

Prerequisite: Nil

Course Objectives: To expose the subject highlights on elements of estimation and costing, budgeting of service connections and also 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 & CONTRACTING **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 labour cost(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.

Principles of contracting :Terms, conditions, and types of contract system,Tender,tendering procedure and preparation of simple tender, Terms and conditions of tender, procedure for inviting and scrutinizing of tender, Importance of Earnest Money Deposit, Security Deposit and S.O.R

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 should 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 over head 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
(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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code:	OPEN ELECTIVE - I	L	T	P
Credits: 3		3	-	-

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VI Semester		
Code: 80H03	**ENGLISH COMMUNICATION AND PRESENTATION SKILLS LAB** (Common for EEE, ECE,CSE and IT)	**L**	**T**	**P**
Credits: 1		**-**	**-**	**2**

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 the learners 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

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

Common web mail services, yahoo, gmail etc, 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

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

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

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.

Reference Books

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
(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		1		1						2		2			
CO4					1	1			1	2		2			
CO5				1	1				1	2		2			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 80445	BASIC SIMULATION LAB	L	T	P
Credits: 1.5		-	-	3

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 (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			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			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 80417	MICROPROCESSORS AND MICROCONTROLLERS LAB	L	T	P
Credits: 1.5		-	-	3

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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VI Semester		
Code: 80M03	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE (Common for EEE, ECE, CSE & IT)	L	T	P
Credits: Nil		2	-	-

Pre requisites: Nil

Course objective: To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.

MODULE- I Introduction to traditional knowledge 7 Periods

Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge *vis-à-vis* formal knowledge

MODULE-II Protection of traditional knowledge 6 Periods

The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

MODULE-III Legal frame work and TK 6 Periods

A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act);

B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.

MODULE-IV Traditional knowledge and intellectual property 6 Periods

Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

MODULE-V Traditional knowledge in different sectors **7 Periods**

Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

References

1. Amit Jha,**Traditional Knowledge System in India**, 2009.
2. Basanta Kumar Mohanta and Vipin Kumar Singh, **Traditional Knowledge System and Technology in India,** Pratibha Prakashan, 2012.
3. Amit Jha, **Traditional Knowledge System in India,** Atlantic publishers, 2002
4. Kapil Kapoor**,** Michel Danino, **"Knowledge Traditions and Practices of India"**

E- Resources

1. https://www.youtube.com/watch?v=LZP1StpYEPM
2. http://nptel.ac.in/courses/121106003/

Course Outcomes

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

1. Understand the concept of Traditional knowledge and its importance
2. Know the need and importance of protecting traditional knowledge.
3. Know the various enactments related to the protection of traditional knowledge.
4. Understand the concepts of Intellectual property to protect the traditional knowledge.
5. Know the various streams of Indian traditional knowledge.

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**				**2**			
CO3						**2**		**2**				**2**			
CO4						**2**		**2**				**2**			
CO5						**2**		**2**				**2**			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech. VII Semester		
Code:80H05	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

1. Kotler Philip & Keller Kevin Lane, **"Marketing Management"**, PHI, 12th edition, 2005
2. Koontz & Weihrich, **"Essentials of Management"**, TMH, 6th edition, 2005.
3. Thomas N.Duening & John M. Ivancevich **"Management - Principles and Guidelines"**, Biztantra, 5th edition 2003.
4. Memoria & S.V. Gauker, **"Personnel Management"**, Himalaya, 25th edition, 2005
5. 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:

After completion 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
(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	3	1				
CO2		3							2		1				
CO3		3								2	1				
CO4		3		2	1										
CO5				2			3				1				

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 80219	POWER SYSTEM ANALYSIS AND CONTROL	L	T	P
Credits: 3		3	-	-

Prerequisites: DC Machines & Transformers, AC Machines, Power Transmission Systems.

Course Objectives: To expose the students about the modeling of power system under steady state condition and apply numerical methods to solve the load flow problems. It deals about the modeling and analyze of power system under fault condition. It also emphasis on steady state stability of the system.

MODULE I Introduction 10 Periods

Need for system planning and operational studies – basic components of a power system.- Introduction to restructuring - Single line diagram – per phase and per unit analysis – Generator - transformer – transmission line and load representation for different power system studies - Primitive network - construction of Y-bus using direct inspection and singular transformation methods.

MODULE II Power Flow Analysis 10 Periods

Importance of power flow analysis in planning and operation of power systems - statement of power flow problem - classification of buses - development of power flow model in complex variables form – Load flow solutions using Gauss Seidal Method: Acceleration factor, Load flow Solution with and without PV buses – Algorithm and Flowchart – Numerical problems (Max. 3 Buses). Load flow solution using Newton-Raphson method in Polar Co-ordinate form – Algorithm and flowchart. Load flow solution using Fast Decoupled method - Algorithm and flowchart. Comparison of Different Methods.

MODULE III Fault Analysis 10 Periods

A: Balanced Fault Analysis: Importance of short circuit analysis - assumptions in fault analysis - analysis using Thevenin's theorem - Z-bus building algorithm - fault analysis using Z-bus.Balanced fault analysis under no load and loaded conditions - Computations of short circuit capacity, post fault voltage and currents.

B:Unbalanced Fault Analysis: Introduction to symmetrical components – sequence impedances – sequence circuits of synchronous machine, transformer and transmission lines - sequence networks analysis of single line to ground, line to line and double line to ground faults using Thevenin's theorem and Z-bus matrix.

MODULE IV Stability Analysis 9 Periods

Importance of stability analysis in power system planning and operation - classification of power system stability - angle and voltage stability.

Single Machine Infinite Bus (SMIB) system: Development of swing equation - equal area criterion - determination of critical clearing angle and time – solution of swing equation by modified Euler method and Runge-Kutta fourth order method.

MODULE V Load Frequency Control – I 9 Periods

Modeling of Governor, Turbine and Generators with corresponding block diagram representation and transfer function. **Single Area Load Frequency Control:** Necessity of

keeping frequency constant. Definitions of control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case.

Load Frequency Control – II: Proportional plus Integral control of single area and its block diagram representation - Steady state response – Load Frequency Control and economic dispatch control. Load frequency control of two area system – Uncontrolled case and controlled case – Tie - Line bias control.

TEXT BOOKS

1. C.L.Wadhwa, **"Electrical Power Systems"**, New Age International (P) Limited, Publishers, 4th Edition, 2005.
2. I.J.Nagrath and D.P.Kothari, **"Modern Power System Analysis"**, Tata McGraw-Hill Publishing Company, 4th Edition, Reprint 2005.
3. Abhijit Chakrabarthi and Sunita Halder, **"Power System Analysis Operation and Control"**, PHI Learning Pvt. Ltd., 3rd Edition, 2010.

REFERENCES

1. William Stagg, **"Computer Methods in Power Systems",** McGraw-Hill, 1968.
2. Pai, M. A., and Dheeman Chatterjee, **"Computer Techniques in Power System Analysis"** McGraw-Hill Education (India), 2014.
3. Grainger, John J., and William D. Stevenson, **"Power System Analysis"**, McGraw-Hill, 1994.
4. A.R.Bergen, **"Power System Analysis"**, Prentice Hall Inc., 3rd Edition, Reprint 2004.
5. Hadi Saadat, **"Power System Analysis"**, PSA Publishing, 3rd Edition, 2010.

E - RESOURCES

1. https://sites.google.com/site/pradeeppsanotes2017/
2. http://nptel.ac.in/courses/108105067/
3. http://nptel.ac.in/courses/108105066/

COURSE OUTCOMES

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

1. Model power systems under steady state condition and form power system network matrices.
2. Understand the load flow studies.
3. Analyse the power system under fault condition.
4. Analyze the stability of the power system.
5. Analyze the steady state behavior of the power system for voltage and frequency fluctuations and design suitable controller.

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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 80228	WIND AND SOLAR ENERGY SYSTEMS (Professional Elective – III)	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., Vasi Juzer, Patil, Mahesh B. "**Solar Photovoltaic: A Lab Training Module "** 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 (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**	

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 80229	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 Book:

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. 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 (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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 80420	**DIGITAL SIGNAL PROCESSING** (Professional Elective - III)	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: Signals & Systems.

Course Objective:

This course introduces the processing of Discrete time signals using various transforming techniques and structures of IIR and FIR filters and also the concept of Multi-rate Digital signal Processing.

MODULE-I: Discrete Time Signals, Systems and Discrete Fourier Series 12 Periods

Discrete Time Signals, Systems: Discrete time signals & discrete time systems, time response & frequency response analysis of Discrete Time Linear time invariant Systems, Discrete time systems described by difference equations. Convolution of Discrete Time Signals and sequences

Discrete Fourier Series: DFS Representation of periodic sequences and Properties of Discrete Fourier Series.

MODULE-II: Transforms 8 Periods

Discrete Fourier Transform (DFT): Discrete Fourier Transforms: Definition and Properties of Discrete Fourier Transforms, Linear Convolution of sequences using DFT and Circular Convolution, Problems on DFT.

Fast Fourier Transforms (FFT): Definition, Radix-2 decimation in time and decimation in frequency FFT Algorithms and Inverse FFT.

MODULE-III: IIR Digital Filters 10 Periods

A: Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design by Impulse Invariance

B:Bilinear transformation- LPF, HPF, BPF, BRF filters design using frequency translation, Realization of IIR filters.

MODULE-IV: FIR Digital Filters 10 Periods

Characteristics of FIR Digital Filters, Frequency Response, Design of Linear phase FIR Digital Filters using Fourier Series and Window Techniques, Comparison of IIR & FIR filters, Realization of FIR filters

MODULE-V: DSP Applications and Processors 8 Periods

Multirate Digital Signal Processing: Decimation, Interpolation, Sampling rate conversion by a rational Factor.

DSP Processors: Architecture and features of TMS320C67XX processor.

Text Books

1. John G. Proakis, Dimitris G. Manolakis, **"Digital Signal Processing, Principles, Algorithms, and Applications"**, Pearson Education / PHI, 4th Edition, 2007.
2. A.Nagoorkani, **"Digital signal processing"**, Tata McGraw Hill, 2nd Edition, 2012.

3. Avtar Singh and S. Srinivasan, **Digital Signal Processing Implementations Using DSP Microprocessors – with Examples from TMS320C54xx**, CENGAGE Learning, India, 1st Edition, 2008.

References

1. Shalivahana, Vallava Raju, Gnana Priya, **"Digital Signal Processing"**, TATA McGraw Hill, 2nd Edition, 2010.
2. Alan V. Oppenheim, Ronald W. Schafer, **"Digital Signal Processing"**, PHI Education, 2006.

E-Resources

1. https://archive.org/details/DIGITALSIGNALPROCESSING.
2. http://freevideolectures.com/Course/2339/Digital-Signal-Processing-IITKharagpur
3. https://www.journals.elsevier.com/digital-signal-processing/
4. https://www.journals.elsevier.com/signal-processing/
5. https://www.youtube.com/watch?v=6dFnpz_AEyA
6. https://www.youtube.com/watch?v=6dFnpz_AEyA
7. http://nptel.ac.in/courses/117102060/

Course Outcomes:

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

1. Understand the nature of discrete time signals and DFS computation
2. Understand DTFT, DFT and the fast computation of DFT using FFT algorithms and implement in real-time applications.
3. Design IIR Digital filters for the given specifications.
4. Design FIR Digital filters for the given specifications.
5. Design Real time systems using the multirate processing techniques and the DSP processors.

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**		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 80230	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

A: System of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor.

B: 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 – Battery electric 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 Power System 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 and Electric 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

1. Understand various types of Electrical Heating, Welding.
2. Design various illuminating systems for various applications like domestic, Industry, commercial buildings.
3. Describe the different types of electric breaking and its characteristics.
4. Analyze speed – time characteristics of electric drive.
5. Choose a drive for a particular electrical application.

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**		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 80231	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 9 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 – 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 10 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.

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 (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**		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 80232	SPECIAL MACHINES (Professional Elective – IV)	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 (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**		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code:	OPEN ELECTIVE - II	L	T	P
Credits: 3		3	-	-

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 80P01	INTERNSHIP – III/ MINI PROJECT	L	T	P
Credits: 2		-	-	-

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 80P02	PROJECT STAGE - I	L	T	P
Credits: 2		-	-	4

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 80220	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 analyse 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. Analyse the performance of power system protection 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			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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VII Semester		
Code: 80221	ELECTRONIC DESIGN LAB	L	T	P
Credits: 1		-	-	2

Course Objectives: To provide hands on experience about the electronics design suitable for various applications.

List of Experiments:

The following circuits have to be made and tested using general purpose PCB

1. Full wave rectifier circuit with filter
2. 5V/12V Power Supply Circuit using LM7805/7812
3. SCR triggering circuit using UJT
4. Clipper Circuit
5. Clamper Circuit
6. Comparator Circuits using IC 741 OP AMP.
7. Integrator and Differentiator Circuits using IC 741 OP AMP.
8. Active Low pass and High pass Filter circuits.
9. RC Phase Shift Oscillators using IC 741 Op-Amp.
10. Astable Multivibrator circuit using IC 555
11. Monostable Multivibrator circuit using IC 555
12. Schmitt Trigger Circuits circuit using IC 555.

Course Outcomes:

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

1. Fabricate electronic circuits using PCB
2. Make power supply circuits
3. Build clipper and clamper circuits
4. Construct Oscillator circuits
5. Design comparator circuits

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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: 80233	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

Introduction of the power quality problem, terms used in PQ: voltage, sag, swell, surges, Harmonics, over voltages, spikes, voltage fluctuations, transients, interruption, overview of power quality phenomenon. Remedies to improve power quality, power quality monitoring.

Power quality and EMC standards: Introduction to standardization, IEC electromagnetic compatibility standards, European voltage characteristics standards, PO surveys.

MODULE II Power Interruptions 10 Periods

Interruptions-definition-difference between failure, outage, interruptions-causes of long interruptions origin of interruptions-limits for the interruption frequency-limits for the interruption duration-costs of interruption-overview of reliability evaluation to power quality, comparison of observations and reliability evaluation.

Short interruptions-definitions, origin of short interruptions, basic principle, fuse saving, voltage magnitude events due to re-closing , voltage during the interruption, monitoring of short interruptions , difference between medium and low voltage systems, multiple events, single phase tripping-voltage and current during fault period, voltage and current at post fault period, stochastic prediction of short interruptions.

MODULE III Voltage Sag - Characterization 10 Periods

A: Voltage sag-definition, causes of voltage sag, voltage sag magnitude, monitoring theoretical calculation of voltage sag magnitude, voltage sag calculation in non-radial systems meshed systems. Voltage sag duration.

B: Three phase faults, phase angle jumps, magnitude and phase angle for three phase unbalanced sags. Load influence on voltage sags.

MODULE IV PQ Consideration in Industrial Power Systems 9 Periods

Voltage sag-equipment behavior of power electronic loads, induction motors, synchronous motors, computers, consumer electronics adjustable speed AC drives and its operation. Mitigation of AC drives, adjustable speed DC drives and its operation, mitigation methods of DC drives.

MODULE V Compensation Techniques for Interruptions and Voltage Sags **9 Periods**

Overview of mitigation methods-from fault trip, reducing the number of faults, reducing the fault clearing time changing the power system, installing mitigation equipment, improving equipment immunity, different events and mitigation methods. System equipment interface-voltage source converter, series voltage controller, shunt controller, combined shunt and series controller.

Text Books

1. M.H.J Bollen, **"Understanding Power Quality Problems: Voltage Sags and Interruptions"**, New York: IEEE Press, 1999.
2. Roger. C. Dugan, Mark. F. McGranagham, Surya Santoso, H.Wayne Beaty, **"Electrical Power Systems Quality"**, McGraw Hill, 2003.

References

1. R.S.Vedam, M.S.Sarma, **"Power Quality – VAR Compensation in Power Systems"**, CRC Press, 2013.
2. C. Sankaran, **"Power Quality"**, CRC press, Taylor & Francis group, 2002.
3. Ewald F. Fuchs, Mohammad A. S. Masoum, **"Power Quality in Power Systems and Electrical Machines"**, Academic Press, 2nd Edition, 2011.
4. Angelo Baggiri, **"Handbook of Power Quality"**, John Wiley & Sons, 1st Edition, 2008.
5. Francisco C. De La Rosa, **"Harmonics and Power Systems"**, CRC Press, 1st Edition, 2006.

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

1. Estimate severities of power quality problems in distribution system and understand the IEC, EMC standards.
2. Compute voltage sag from upstream to downstream.
3. Analyze the Causes of voltage sag and its characteristics for single phase and three phase system.
4. Evaluate the behavior of power electronic loads using various drives in industry.
5. Analyze the mitigation methods for power quality issues.

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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: 80234	ELECTRICAL ENERGY CONSERVATION AND AUDITING (Professional Elective-V)	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.

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
(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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: 80235	ELECTRIC SMART GRID (Professional Elective-V)	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 10 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"**, IEEE Press, 2012.
2. Janaka Ekanayake, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama and Nick Jenkins, **"Smart Grid Technology and Applications"**, IEEE Press, 2012.

References

1. Aranya Chakraborthy 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 (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**

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: 80236	PROGRAMMABLE LOGIC CONTROLLERS 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, PLC processor, programming equipment, programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

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.

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"** , 5th Edition, Elsevier, 2009.
2. J R Hackworth and F D Hackworth Jr, "**Programmable Logic Controllers –**

Programming methods and Applications" 5th Edition,Pearson Publications, 2004.

References

1. John W Webb and Ronald A Reiss, **"Programmable Logic Controllers – Principles and Applications"**, 5th Edition, Prentice Hall of India, 1998.
2. Rajesh Mehra and Vikrant Vij, **"PLCs & SCADA: Theory and Practice", 1st Edition, Laxmi 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/
3. nptel.ac.in/courses/112102011/11

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 (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**

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: 80237	SUPERVISORY CONTROL AND DATA ACQUISITION (Professional Elective-VI)	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 the electric 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.PDF

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 (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**

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: 80238	**NEURAL NETWORKS AND FUZZY LOGIC**	**L**	**T**	**P**
Credits: 3	(Professional Elective-VI)	**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
(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

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code:	OPEN ELECTIVE - III	L	T	P
Credits: 3		3	-	-

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: 80P03	SEMINAR	L	T	P
Credits: 1		-	-	2

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. VIII Semester		
Code: 80P04	PROJECT STAGE - II	L	T	P
Credits: 10		-	-	20

OPEN ELECTIVES

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80139	ENVIRONMENTAL IMPACT ASSESSMENT AND LIFE CYCLE ANALYSIS (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisite: Environmental Sciences

Course Objectives: The main objective of this course is to provide in-depth knowledge about various methodologies in assessing the environmental impact of various developmental projects. It also provides the knowledge to design a more publicly acceptable project which helps in achieving sustainable development.

MODULE I **10 Periods**

Concept of EIA: Significance of EIA, Factors affecting EIA, Classification of Environmental Parameters, Elements of EIA: Initial Environmental Examination, Preparation of Environmental Base map, Impact Evaluation and Analysis, Environmental Impact Statement (EIS) and Environmental Management Plan (EMP), List of Projects which require EIA.

EIA Methodologies: General methodology of EIA with flow chart, EIA Methods: Ad-hoc methods, Matrix methods, Network methods, Environmental Media Quality Index method, Overlay methods, Cost/Benefit Analysis.

MODULE II **10 Periods**

EIA of Soil: Methodology for the assessment of developmental activities on Soil: Delineation of study area, Identification of impacts, Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures, Environmental impacts of Deforestation: Causes, Effects and Mitigation measures.

EIA of Ground water: Ground water quantity and quality impacts, Systematic method for evaluation of various developmental activities on Ground water environment.

EIA of Surface water: Introduction, Projects which create concerns, Methodology for the assessment of Impacts on surface water environment.

MODULE III **10 Periods**

A: EIA of Air and Noise environment:

Air Pollution sources, Generalized approach for assessment of air pollution impact, Effects of Noise on people and their physiological responses, systematic methodology for assessing environmental impacts of noise

B: EIA of Biological Environment

Introduction to Biodiversity and Systematic approach for evaluating Biological impacts.Assessment of impacts of developmental activities on Vegetation and Wild life.

MODULE IV **9 Periods**

Environmental Legislation: Legislation policies, Environmental Protection Act, Water Act, Water Cess Act, The Air (Prevention & Control of pollution) Act, Motor Act, Wild life Act.

Environmental Audit: Objectives, Advantages, Types of environmental Audit, Audit protocol, Stages of Environmental Audit: Pre-audit activities, Onsite activities and Post audit activities.

MODULE V **9 Periods**

Life Cycle Assessment: Definition, Scope, Methodology, its applications and drawbacks. **Case studies:** Preparation of EIA for developmental activities: Industrial projects, Land clearing projects, River valley projects, Construction projects, Highways and Road projects.

Text Books

1. Y. Anjaneyulu, **"Environmental Impact Assessment Methodologies",** BS Publications, CRC Press, 2nd edition, 2011.
2. R.R. Barthwal **"Environmental Impact Assessment",** New Age International Publishers, 2nd edition, 2012.

References:

1. M. Anji Reddy, **"Environmental Impact Assessment: Theory and Practice",** BS Publications 1st edition, 2016.
2. Canter, **"Environmental Impact Assessment",** India edition, 1st edition, 2015.
3. N. S. Raman, A.R. Gajbhiye, S.R. Khandeshwar **"Environmental Impact Assessment",** I.K. International Publishing House, Kindle edition, 2014.

E-Resources

1. https://en.wikipedia.org/wiki/Environmental_audit
2. https://fenix.tecnico.ulisboa.pt/downloadFile/3779577342892/5.%20EIA%20methodologies.pdf
3. https://www.dlsweb.rmit.edu.au/conenv/envi1128/Reading-CSTI.pdf

Course Outcomes:

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

1. Understand the significance of EIA and the methodologies used for assessing the environmental impacts of developmental projects.
2. Identify, predict and assess the impacts of projects on soil, ground water and surface water environment.
3. Identify a systematic methodology for assessing environmental impacts of projects on air, noise and biological environment.
4. Gain knowledge on various Environmental legislations, policies and Acts.
5. Acquire knowledge on environmental audit, procedure and preparation of audit report.

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		3	3	3	2	2					
CO2			2	3		2	1	3	3	2					
CO3			3	2	3	2	2	1	3	2					
CO4							3	2	3	3					
CO5							3	3	2	3					

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80148	GREEN BUILDINGS (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisite: NIL

Course Objectives:

The purpose of the course is provide an overview of emerging delivery systems for high performance green buildings and the basis on which their sustainability can be evaluated.

MODULE I **9 Periods**

Introduction to green buildings, green materials, sources of green materials, high-performance green buildings Impacts of building construction, operation, and disposal Methods and tools for building assessment, Green Globes

MODULE II **10 Periods**

The green building process, Design and construction relationships, benefits of green building quality, healthy and safe environments , Site and landscape strategies.

MODULE III **10 Periods**

A: Building energy system strategies, Water cycle strategies, Materials selection strategies, Indoor Environmental Quality IEQ

B: Analysis and strategies, Construction, team responsibilities and controls, Building commissioning strategies

MODULE IV **9 Periods**

Economic issues and analysis, Use of the Green Strategies cost estimating tool, Future directions in green, high performance building technologies

MODULE V **10 Periods**

Carbon accounting Green Building Specification, Case Study on green buildings, Net Zero Energy Buildings, Sustainable Constructions in civil Engineering.

Text Books

1. Abe Kruger and Carl,"**Green Building, Principles and Practices in Residential Construction**", In 2012, Seville Publication.
2. Ross Spiegel, Dru Meadows, "**Green Building Materials: A Guide to Product Selection and Specification**", 3rd Edition,October 2010

References

1. Charles J. Kibert,"**Sustainable Construction: Green Building Design and Delivery Hardcover – Import**", 16 Nov 2012

E-Resources

1. http://www.ncrec.gov/Pdfs/bicar/GreenBuilding.pdf

Course Outcomes:

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

1. Identify green Building Materials and their Sources.
2. Understand the construction process of green buildings and their benefits quality, healthy and safe environments
3. Learn the strategies to construct green buildings.
4. Identify the issues a raised due to construction of green buildings
5. Gain knowledge on the case studies of green buildings.

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**		**3**	**2**	**1**	**1**	**1**	**1**			
CO2		**1**	**2**			**2**	**3**			**1**		**1**			
CO3	**1**	**1**	**1**				**2**					**1**			
CO4				**2**			**2**			**1**	**2**	**1**			
CO5			**1**			**1**	**1**		**1**	**2**	**1**	**1**			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80149	DISASTER MANAGEMENT & MITIGATION (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives: This course provides the knowledge and understanding of the disaster phenomenon, its different contextual aspects, impacts and public health consequences along with International Strategy for Disaster Reduction. It also has the potential to make the student design and implement disaster mitigation measures.

MODULE I: Concept of Hazards and Disasters **10 Periods**

Environmental Hazards & Disasters Concept of Environmental Hazards, Environmental Stress & Environmental Disasters. Different Approaches & relation with human Ecology – Landscape, Ecosystem and Perception Approach - Human Ecology & its application in geographical researches.

Types of Environmental Hazards & Disasters Natural hazards and Disasters – Man induced hazards & Disasters - Natural Hazards- Planetary Hazards/ Disasters - Extra-Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards.

MODULE II: Classification of Hazards **10 Periods**

Endogenous Hazards Volcanoes: Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes – Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions. Earthquake Hazards/ Disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of earthquakes - Earthquake Hazards in India - Human adjustment, perception & mitigation of earthquake. Landslides: causes and impacts. Avalanches -causes and impacts.

Exogenous Hazards Infrequent events: Cyclones – Lightning – Hailstorms, Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes , distribution human adjustment, perception & mitigation), Cumulative atmospheric hazards/ disasters : Floods- Droughts- Cold waves- Heat waves Floods:- Causes of floods- Flood hazards in India- Flood control measures Human adjustment, perception & mitigation, Droughts: Impacts of droughts- Drought hazards in India- Drought control measures, Extra Planetary Hazards/ Disasters-Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion Soil Erosion: Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion. Chemical hazards/ disasters: Release of toxic chemicals, nuclear explosion- Sedimentation processes, Sedimentation processes: Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation, Biological hazards/ disasters: Population Explosion.

MODULE III: Approaches and Measures in Disaster Management **10 Periods**

A: Emerging Approaches Three Stages: Pre-disaster stage (preparedness), Emergency Stage, Post Disaster stage (Rehabilitation).

B: Natural Disaster Reduction & Management Provision of Immediate relief measures

to disaster affected people, Prediction of Hazards & Disasters, Measures of adjustment to natural hazards

MODULE IV: Disaster Management 9 Periods

An integrated approach for disaster preparedness, mitigation & awareness. Mitigation-Institutions- discuss the work of following Institution.

a. Meteorological Observatory
b. Seismological Observatory
c. Volcanological Institution
d. Hydrology Laboratory
e. Industrial Safety Inspectorate
f. Institution of Urban & Regional Planners
g. Chambers of Architects
h. Engineering Council
i. National Standards Committee

Integrated Planning- Contingency Management Preparedness –

a Education on disasters
b Community involvement
c The adjustment of Human Population to Natural Hazards & Disasters Role of Media

Monitoring Management- Discuss the programme of disaster research & mitigation of disaster of following organizations.

a International Council for Scientific Unions ICSU- Scientific Committee on Problems of the Environment SCOPE, International Geosphere- Biosphere programme IGBP
b World Federation of Engineering Organizations WFED
c National Academy of Sciences
d World Meteorological Organizations WMO
e Geographical Information System GIS
f International Association of Seismology & Physics of Earth's Interior IASPEI
g Various U.N agencies like UNCRD, IDNDR, WHO, UNESCO, UNICEF, UNEP.

MODULE V: Disaster Management in India 9 Periods

A regional survey of Land Subsidence, Coastal Disaster, Cyclonic Disaster & Disaster in Hills with particular reference to India

Ecological planning for sustainability & sustainable development in India- Sustainable rural development: A Remedy to Disasters-Role of Panchayats in Disaster mitigations **C:** Environmental policies & programmes in India- Institutions & National Centers for Natural Disaster reduction, Environmental Legislations in India, Awareness, Conservation Movement, Education & Training.

Text Books

1. Jagbir Singh, "Disaster Management–Future Challenges and Opportunities", I.K.International Publishing House, 1st Edition, 2005.

2. Coppala P Damon, **"**Introduction to International Disaster Management"**,** ABD Publishers**,** 2007**.**

References

1. R.B.Singh Ed, "Environmental Geography", Heritage Publishers, New Delhi, 1st Edition,1990.

2. Kates,B.I & White. G.F, "The Environment as Hazards", oxford publishers, 5th Edition, New York, 1978.
3. R.B. Singh Ed - Disaster Management, Rawat Publication, New Delhi, 1st Edition, 2000.

E- Resources:

1. http://www.wcpt.org/disaster-management/what-is-disaster-management.
2. http://study.com/academy/lesson/what-are-cyclones-types-causes-effects.html.

Course Outcomes:

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

1. Analyze, evaluate and manage the environmental, social, cultural, economical, legal and organizational aspects influencing vulnerabilities and capacities to face disasters.
2. Assess the different public health aspects at local and global levels as a result of Disaster and can plan well to mitigate them.
3. Gain knowledge in various emerging approaches and measure in disaster management.
4. Understand the role of disaster management through Meteorological Observatory, Seismological Observatory, Volcanological Institution, etc.,
5. Acquire the information about Disaster Management, Ecological planning and sustainable development and Environmental policies, Disaster Reduction programs in India.

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	2	3	2	2				
CO2	3	2				2	3	2	3	2	2				
CO3	3	2				2	3	2	3	2	2				
CO4	3	2				2	3	2	3	2	2				
CO5	3	2				2	3	2	3	2	2				

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80234	ELECTRICAL ENERGY CONSERVATION AND AUDITING (Open Elective)	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.

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 (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**		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80240	ELECTRICAL SAFETY AND ENERGY MANAGEMENT (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives:

This course deals with the general safety requirements during the electrical installations. The course emphasis on the various objectives of energy management and auditing.

MODULE I: RULES & REGULATIONS 10 Periods

Power sector organization and their roles – significance of IE rules & IE acts – general safety requirements: Span conductor configuration, spacing and clearing, sag, erection, hazards of electricity.

MODULE II: INSTALLATION AND EARTHING OF EQUIPMENTS 10 Periods

Classification of electrical installation - earthing of equipment bodies – electrical layout of switching devices and SC protection – safety in use of domestic appliances – safety documentation and work permit system – flash hazard calculations – tools and test equipments.

MODULE III: SAFETY MANAGEMENT AND FIRST AID 9 Periods

A:Safety aspects during commissioning – safety clearance notice before energizing – safety during maintenance – maintenance schedule – special tools – security grand– check list for plant security – effects of electric and electromagnetic fields in HV lines and substations.

B:Safety policy in management & organizations – economic aspects – safety program structure – elements of good training program – first aid – basic principles – action taken after electrical shock – artificial respiration and methods – chocking – poisoning.

MODULE IV:FIRE EXTINGUISHERS 10 Periods

Fundamentals of fire – initiation of fires – types – extinguishing – techniques – prevention of fire – types of fire extinguishers- fire detection and alarm system – CO2 and Halogen gas schemes, foam schemes.

MODULE V:ENERGY MANAGEMENT & ENERGY AUDITING 9 Periods

Objectives of energy management – energy efficient electrical systems – energy conservation and energy policy – renewable source of energy – energy auditing – types and tips for improvement in industry.

Text Books

1.John Codick, **"Electrical safety hand book",** McGraw Hill Inc, New Delhi, 2000.

2.V. Manoilov, **"Fundamentals of electrical safety",** Mir Publishers, MOSCOW, 1975.

References

1. C.S. Raju, **"A Practical Book on domestic safety",** Sri Sai Publisher, Chennai, 2003.

2.**Power Engineering Hand book**, TNEB Engineers officers, Chennai, 2002.

3.S. Rao, R.C. Khanna, **"Electrical safety, Fire safety engineering and safety management"**, Khanna Publisher, Delhi, 1998.

4.The Indian electricity rules, 1956, authority regulations, 1979, Commercial Law Publication, Delhi, 1999.

5.W.F.Cooper, **"Electrical safety Engineering"**,Newnes-Butterworth company, 1978.

E-Resources

1.http://nptel.ac.in/courses/103106071/5

2.https://beeindia.gov.in/

3.https://www.electrical4u.com/equipment-earthing/

4.https://www.electricaltechnology.org/2015/05/earthing-and-electrical-grounding-types-of-earthing.html

Course Outcomes

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

1. Gain basic knowledge on Indian Power sector organization and their roles.
2. Understand the concepts of earthing and its standards.
3. Acquire the basic knowledge on First aid and safety during electrical installation**..**
4. Distinguish various fire extinguishers and their classification.
5. Understand the basic concepts of energy auditing.

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**		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80241	ENERGY STORAGE SYSTEMS (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives: This course deals with the need for electrical energy storage, different electrical storage technologies, types and features of energy storage systems and the applications of electrical energy storage.

MODULE I: ELECTRICAL ENERGY STORAGE TECHNOLOGIES 10 Periods

Characteristics of electricity, Electricity and the roles of EES, High generation cost during peak-demand periods, Need for continuous and flexible supply, Long distance between generation and consumption, Congestion in power grids, Transmission by cable.

MODULE II: NEEDS FOR ELECTRICAL ENERGY STORAGE 10 Periods

Emerging needs for EES, More renewable energy, less fossil fuel, Smart Grid uses. The roles of electrical energy storage technologies, The roles from the viewpoint of a utility, The roles from the viewpoint of consumers, The roles from the viewpoint of generators of renewable energy.

MODULE III: FEATURES OF ENERGY STORAGE SYSTEMS 10 Periods

A: Classification of EES systems, Mechanical storage systems, Pumped hydro storage (PHS), Compressed air energy storage (CAES), Flywheel energy storage (FES).

B: Electrochemical storage systems, Secondary batteries, Flow batteries, Chemical energy storage, Hydrogen (H2), Synthetic natural gas (SNG).

MODULE IV: TYPES OF ELECTRICAL ENERGY STORAGE SYSTEMS 9 Periods

Electrical storage systems, Double-layer capacitors (DLC), Superconducting magnetic energy storage (SMES), Thermal storage systems, Standards for EES, Technical comparison of EES technologies.

MODULE V: APPLICATIONS 9 Periods

Present status of applications, Utility use (conventional power generation, grid operation & service) , Consumer use (uninterruptable power supply for large consumers), New trends in applications ,Renewable energy generation, Smart Grid, Smart Micro grid, Smart House, Electric vehicles, Management and control hierarchy of storage systems, Internal configuration of battery storage systems, External connection of EES systems , Aggregating EES systems and distributed generation (Virtual Power Plant), Battery SCADA– aggregation of many dispersed batteries.

Text Books

1. James M. Eyer, Joseph J. Iannucci and Garth P. Corey, **"Energy Storage Benefits and Market Analysis"**.
2. **"The Electrical Energy Storage"** by IEC Market Strategy Board.

References

1.Jim Eyer, Garth Corey, **"Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide, Report",** Sandia National Laboratories, Feb 2010.

E - Resources

1. http://nptel.ac.in/courses/108105058/
2. http://www.nptel.ac.in/courses/108103009/pdf/lec33.pdf

Course Outcomes

At the end of the course, students will be able to
1. Understand the different types of electrical energy storage technologies.
2.Learn about the need for electrical energy storage.
3.Comprehend the various features energy storage systems.
4.Understand the various types of electrical energy storage systems.
5.Emphasize the various applications of electrical energy storage.

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		

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80352	TOTAL QUALITY MANAGEMENT (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives:

To give the students an overview of quality and TQM and explaining the salient contributions of Quality Gurus like Deming, Juran and Crosby and general barriers in implementing TQM and also get basic knowledge about ISO.

MODULE I: Introduction **10 Periods**

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, and Customer retention - Costs of quality.

MODULE II: TQM Principles **10 Periods**

Leadership - Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

MODULE III: Statistical Process Control (SPC) **10 Periods**

A: Statistical fundamentals – Measures of central Tendency and Dispersion - Population and Sample.

B: Control Charts for variables and attributes, Industrial Examples. Process capability. Concept of six sigma – New seven Management tools.

MODULE IV: TQM Tools **09 Periods**

Bench marking -Reason to bench mark, Bench marking process - FMEA - Stages, Types. Quality Function Deployment (QFD) - House of Quality - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures

MODULE V: Quality Systems **09 Periods**

Need for ISO 9000 and Other Quality Systems - ISO 9000-2008 Quality System - Elements, Implementation of Quality System Documentation, Quality Auditing - QS 9000 - ISO 14000 - ISO 18000, ISO 20000, ISO 22000 TS 16949, ISO 14000, AS9100– Concept, Requirements and
benefits – case studies.

Text Books

1. Dale H. Besterfiled, "**Total Quality Management**", 3rd, Pearson Education Asia, Indian Reprint, 2010.
2. Subburaj Ramasamy" **Total Quality Management**" Tata McGraw - Hill publishers, 2012.

References

1. Suganthi.L and Anand Samuel, "**Total Quality Management**", Prentice Hall (India) Pvt. Ltd., 2011.
2. James R. Evans and William M. Lindsay, "**The Management and Control of Quality**", 8th Edition, Cengage Learning, 2012.
3. Janakiraman. B and Gopal .R.K., "**Total Quality Management - Text and Cases**", Prentice Hall (India) Pvt. Ltd., 2006.
4. Dr S. Kumar, "**Total Quality Management**", Laxmi Publications Ltd., New Delhi 2015.
5. P. N. Muherjee, "**Total Quality Management**", Prentice Hall of India, New Delhi, 2006.
6. Poornima M. Charantimath "**Total Quality Management**" Pearson publications, 2011.

E - Resources

1. https://src.alionscience.com/pdf/RAC-1ST/SOAR7_1st_Chapter.pdf
2. https://onlinecourses.nptel.ac.in/noc17_mg18
3. nptel.ac.in/courses/122106032/Pdf/4_2.pdf
4. www.thecqi.org
5. www.emeraldinsight.com/journal/tqm

Course Outcomes

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

1. Gain basic knowledge in total quality management relevant to both manufacturing and service industry.
2. Implement the basic principles of TQM in manufacturing and service based organization.
3. Apply various SPC tools in real time manufacturing and service industry.
4. Implement various TQM tools like FMEA & QFD.
5. Apply various ISO Standards for real time applications.

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**	**2**			**3**		**3**	**3**			
CO2	**1**				**3**	**2**			**3**		**3**	**3**			
CO3	**1**				**3**	**2**			**3**		**3**	**3**			
CO4	**1**				**3**	**2**			**3**		**3**	**3**			
CO5	**1**				**3**	**2**			**3**		**3**	**3**			

2018-18 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80356	INDUSTRIAL SAFETY (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives:

The purpose of this course is to teach the concept of Industrial Safety & provide useful practical knowledge for workplace safety which helps identification, evaluation and control of all the hazards and potential hazards to prevent or mitigate harm or damage to people, property or the environment.

MODULE I: Introduction **10 Periods**

Definition-Development before industrial revolution-Milestones in industrial safety movement Development of accident prevention programs-3 E's of safety- Development of Safety organizations-Safety and health movement- Managing emergency in industries.

MODULE II: Accident Prevention **10 Periods**

Safety and productivity-Fallacies about safety-Industrial psychology in accident prevention Basic philosophy of accident prevention-Unsafe condition, Unsafe act, Injury, Fault of persons Cost of accidents- Safety education.

MODULE III: Safety Organization & Industrial Hygiene and Hazards **10 Periods**

A: Purpose of a safety organization-Safety policy- Safety committee- types- Role of safety coordinator- Responsibilities, Interferences and Sufferings of safety supervisor-Safety publicity-Accident reporting-Accident investigation-Accident statistics-Safety audits.

B: OSHA and industrial hygiene-work site analysis-recognizing and controlling hazards Occupational diseases prevention-Employee welfare-Statutory welfare schemes, Non statutory schemes-Health hazards-Control strategies- Fire hazards and prevention, Electrical hazard prevention and safety.

MODULE IV: Industrial Process Safety **9 Periods**

Overview-Safety performance by industry sector-Incident pyramid-Process hazard and risk. Failure of defenses - Process safety management-Scope, Functions, Features and Characteristics. Role of organizational levels in Process safety Management-Assessing organizations safety effectiveness.

MODULE V: Human Side of Safety **9 Periods**

Management of change-Process and equipment integrity-Human behavior aspects and modes-The Swiss cheese model of industrial accidents-Active and Latent failures-examples - Safety lessons Human Factors influencing the likelihood of failure-Organizational culture, Demographic effects.

Text Books

1. Krishnan N.V., **"Safety in Industry",** Jaico Publisher House, 2005.
2. Singh, U.K. and Dewan, J.M., "**Safety, Security and risk management",** APH Publishing Company, New Delhi, 2005.

References

1 C. Ray Asfahl, David W. Rieske **" Industrial Safety and health management",** Prentice Hall,2009.

2 R.K. Mishra, **"Safety Management"**, AITBS publishers, 2012.

3 Krishnan N.V., "**Safety in Industry**", Jaico Publisher House, 2005

4 Singh, U.K. and Dewan, J.M., "**Safety, Security and risk management**", APH Publishing Company, New Delhi, 2005.

5 C. Ray Asfahl, David W. RieskE, " **Industrial Safety and health management**", Prentice Hall,2009.

E - Resources

1 https://issuu.com/stmjournalspublication/docs/journal_of_industrial_safety_engine

2 http://www.nsc.org.in/index.php?option=com_content&view=article&id=15&Itemid=99

3 http://www.mdpi.com/journal/safety

4 http://www.sciencedirect.com/science/journal/09219110?sdc=1

Course Outcomes

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

1. Identify the evaluation of industrial safety and health standards.
2. Analyze the philosophies behind industrial accidents.
3. Apply the hierarchical levels in a safety organization and apply the types of industrial hazards and preventive measures.
4. Implement the concept of industrial process safety.
5. Apply the safety procedures for human.

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**			**3**	**3**			**2**		**3**			
CO2	**1**		**2**			**3**	**3**			**2**		**3**			
CO3	**1**		**2**			**3**	**3**			**2**		**3**			
CO4	**1**		**2**			**3**	**3**			**2**		**3**			
CO5	**1**		**2**			**3**	**3**			**2**		**3**			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80357	RENEWABLE ENERGY SOURCES (Open Elective)	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 10 Periods

Solar Collectors: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Solar Energy Storage and Applications: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

MODULE III: Wind Energy & Bio-Mass 10 Periods

A: Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.

B: Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

MODULE IV: Geothermal Energy & Ocean Energy 9 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.

MODULE V: Direct Energy Conversion 9 Periods

Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, merit, materials, applications. MHD generators - principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems. Electron gas dynamic conversion - economic aspects. Fuel cells - Principles of Faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

Text Books

1. G.D. Rai, "**Non-Conventional Energy Sources",** Khanna publishers, 2011.
2. Tiwari and Ghosal, "**Renewable Energy Resources"**, Narosa Publishing House, 2007.

References

1. Twidell & Weir, "**Renewable Energy Sources",** Taylor and Francis Group Publishers, 2015.
2. Sukhatme, **"Solar Energy",** McGraw-Hill-third edition, 2008.
3. B.S Magal Frank Kreith& J.F Kreith "**Solar Power Engineering",** McGraw-Hill Publications, 2010.
4. Frank Krieth & John F Kreider, "**Principles of Solar Energy",** McGraw-Hill, 1981.
5. Ashok V Desai, "**Non-Conventional Energy**", New International (P) Limited, 2003.

E - Resources

1. nptel.ac.in/courses/112105051/
2. https://www.vssut.ac.in/lecture_notes/lecture1428910296.pdf
3. faculty.itu.edu.tr/onbasiogl1/DosyaGetir/62002
4. https://www.journals.elsevier.com/renewable-energy/
5. www.ijrer.org

Course Outcomes

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

1. Understand the principles of solar radiation
2. Recognize solar collectors, Solar energy storage and its applications
3. Classify the harvesting of wind energy & bio-mass energy.
4. Understand the harvesting of geothermal energy & ocean energy.
5. Apply the direct energy conversion methods

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**			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80435	EMBEDDED SYSTEM DESIGN (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Microprocessors and Microcontrollers.

Course Objectives: This course introduces the difference between Embedded Systems and General purpose systems. This course familiarizes to compare different approaches in optimizing General purpose processors. This course provides the design tradeoffs made by different models of embedded systems.

Module - I: Introduction to Embedded Systems **8 Periods**

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

Module - II: Typical Embedded System **12 Periods**

Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

Module - III: Embedded Firmware **10 Periods**

A:Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer.

B: Embedded Firmware Design Approaches and Development Languages.

Module - IV: RTOS Based Embedded System Design **9 Periods**

Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

Module - V: Task Communication **9 Periods**

Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

Text Books

1. Shibu K. V, **"Introduction to Embedded Systems"**, McGraw Hill, 2013.

2. Raj Kamal, **"Embedded Systems"**, TMH.

References

1. Frank Vahid, Tony Givargis, John Wiley,**"Embedded System Design"**.

2. Lyla**, "Embedded Systems"**, Pearson, 2013.

3. David E. Simon, **"An Embedded Software Primer"**, Pearson Education.

E-Resources

1. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.158.9376&rep=rep1&type=pdf
2. http://www.radio-electronics.com/info/processing-embedded/embedded-systems/basicstutorial.php
3. https://onlinecourses.nptel.ac.in/noc17_cs05/preview
4. https://www.youtube.com/watch?v=y9RAhEfLfJs
5. http://www.nptelvideos.in/2012/11/embedded-systems.html

Course Outcomes:

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

1. Understand the basics of an embedded system.
2. Design, implement and test an embedded system.
3. Understand the design tradeoffs made by different models of embedded systems.
4. Know types of operating systems
5. Learn how to Choose an RTOS

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**									
CO2	**2**		**2**	**1**		**1**	**1**					**1**			
CO3	**2**		**3**	**1**	**1**	**2**	**1**				**1**	**1**			
CO4	**1**		**3**	**1**	**1**	**2**	**1**					**1**			
CO5	**1**		**2**	**1**	**1**	**1**						**1**			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80446	PRINCIPLES OF COMMUNICATION ENGINEERING (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: NIL

Course Objectives: To study different modulation techniques used in analog communications and digital communications. To also introduce basics of satellite and optical communications.

MODULE I: Fundamentals of Analog Communication **10 Periods**

Principles of amplitude modulation, AM envelope, frequency spectrum and bandwidth, modulation index and percent modulation, AM Voltage distribution, AM power distribution, Angle modulation - FM and PM waveforms, phase deviation and modulation index, frequency deviation and percent modulation, Frequency analysis of angle modulated waves. Bandwidth requirements for Angle modulated waves.

MODULE II: Band-pass Modulation Techniques **10 Periods**

Introduction, Shannon limit for information capacity, digital amplitude modulation, frequency shift keying, FSK bit rate and baud, FSK transmitter, BW consideration of FSK, FSK receiver, phase shift keying – binary phase shift keying – QPSK, Quadrature Amplitude modulation, bandwidth efficiency, carrier recovery – squaring loop, Costasloop, DPSK.

MODULE III: Base Band Transmission Techniques **10 Periods**

A: Introduction, Pulse modulation, PCM – PCM sampling, sampling rate, signal to quantization noise rate, companding – analog and digital – percentage error,

B: delta modulation, adaptive delta modulation, differential pulse code modulation, pulse transmission – Intersymbol interference, eye patterns.

MODULE IV: Spread Spectrum and Multiple Access Techniques **9 Periods**

Introduction, Pseudo-noise sequence, DS spread spectrum with coherent binary PSK, processing gain, FH spread spectrum, multiple access techniques – wireless communication, TDMA and CDMA in wireless communication systems, source coding of speech for wireless communications.

MODULE V: Satellite and Optical Communication **9 Periods**

Satellite Communication Systems-Keplers Law,LEO and GEO Orbits, footprint, Link model Optical Communication Systems-Elements of Optical Fiber Transmission link, Types, Losses,Sources and Detectors.

Text Books

1. Wayne Tomasi, **"Advanced Electronic Communication Systems",** 6th Edition, PearsonEducation, 2007.

2. Simon Haykin, **"Communication Systems"** , 4thEdition, John Wiley &Sons, 2001.

References

1. H.Taub,DL Schilling,G Saha, "**Principles of Communication"** , 3rd Edition,2007.

2.B.P.Lathi, **"Modern Analog And Digital Communication systems",** Oxford University Press, 3rd Edition,2007.

3. Blake, **"Electronic Communication Systems"** , Thomson Delmar Publications,2002.

4. Martin S.Roden, **"Analog and Digital Communication System"**, PHI, 3rd Edition, 2002.

5. B. Sklar, **"Digital Communication Fundamentals and Applications"**, Pearson Education, 2nd Edition, 2007.

E-Resources

1. Notes on Communication Systems - https://courses.engr.illinois.edu/ece458/ comms2.pdf (Relevant: Chapters 1 to 3)

2. Notes on Modulation Techniques http://www.ece.lehigh.edu/~jingli/teach/ F2005CT/ notes/ AnalogCommunication.pdf

3. http://nptel.ac.in/courses/117105131/

Course Outcomes

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

1. Understand fundamentals of analog communications
2. Understand different band-pass modulation schemes
3. Understand different base-band modulation schemes
4. Understand spread spectrum techniques and multiple access mechanisms
5. Get basic knowledge on satellite and optical communications

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**	**1**	**2**		**2**	**1**	**1**	**1**	**3**			
CO2	**3**	**3**	**3**	**3**	**2**	**2**		**2**	**1**	**1**	**1**	**3**			
CO3	**3**	**2**	**2**	**2**	**2**	**1**		**1**	**1**	**1**		**2**			
CO4	**3**	**3**	**3**	**3**	**3**	**2**			**1**		**1**	**2**			
CO5	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**1**	**1**	**2**			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech		
Code: 80447	BASICS OF VLSI DESIGN (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Basic Electrical and Electronics Engineering

Course Objectives:

The course aims to enable the student to visualize IC Fabrication steps and various IC technologies and to understand electrical properties of MOS, CMOS and Bi CMOS circuits. The focus of the course is also on training the student to draw integrated circuit layouts following design rules. The course also helps the student to understand basic architectures of Data path subsystems, Application Specific Integrated Circuits, of CPLDs and FPGAs.

MODULE-I: IC Technologies & IC Fabrication **10 Periods**

IC Technologies – Review of Enhancement and Depletion MOS transistors, NMOS, PMOS & CMOS fabrications, Comparison of NMOS, CMOS & BiCMOS technologies.
IC Fabrication: Steps in Fabrication-Oxidation, Lithography, Diffusion, Ion implantation, EncapsulationMetallization.

MODULE-II:Basic Electrical Parameters **10 Periods**

I_{ds}-V_{ds} relationships, MOS transistor threshold Voltage (V_t), transconductance(g_m), output conductance(g_{ds}) & figure of merit. Pass transistor, NMOS Inverter, Determination of pull-up to pull-down ratios, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters, Latch-up in CMOS circuits.

MODULE-III:VLSI Circuit Design Processes **10 Periods**

A:VLSI Design Flow, MOS Layers, Stick Diagrams, Lambda based Design Rules and Layout, 2 µm CMOS Design rules for wires, Contacts and Transistors
B:Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits-Scaling models, Scaling function for device parameters, Limitations of Scaling.

MODULE-IV: Data Path Subsystems **9 Periods**

Data Path Subsystems: Subsystem Design – Barrel Shifter, Carry Select and Carry look Ahead Adder, Serial-Parallel and Braun Array Multiplier.

MODULE-V: ASIC's and PLD's **9 Periods**

Application Specific Integrated Circuits – Channel gate array, Channel less gate array and structured gate array.
Programmable Logic Devices - Architectures of CPLDs and FPGAs.

Text Books

1. Kamran Eshraghian, Douglas A. Pucknell, **"Essentials of VLSI circuits and systems"**, PHI, 1st Edition, 2005.
2. K. Lal Kishore, VSV. Prabhakar, **"VLSI Design"**, I. K international Publishing House Private Ltd, 2009.

References

1. Neil H. E Weste, David Harris, Ayan Banerjee, **"CMOS VLSI Design - A circuits and systems perspective"**, Pearson Education, 3rd Edition, 2009.

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1. https://www.ece.uic.edu/~dutt/courses/ece565/lect-notes.html
2. http://www.egr.msu.edu/classes/ece410/mason/files/Ch2.pdf
3. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=92
4. https://www.journals.elsevier.com/integration-the-vlsi-journal/
5. http://nptel.ac.in/courses/117106093/
6. http://nptel.ac.in/courses/117101058/

Course Outcomes:

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

1. Understand the Enhancement and Depletion mode transistors and describe the steps involved in IC fabrication.
2. Understand the electrical properties of MOS and able to describe problem due to CMOS Latch up and the remedies for that.
3. Illustrate circuit diagrams, stick diagrams and layouts for NMOS, CMOS and BiCMOS circuits and the effects of Scaling.
4. Understand Basic architectures of Data path subsystems.
5. Understand Basic architectures of Application Specific Integrated Circuits, of CPLDs and FPGAs.

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**	**1**	**2**	**1**	**2**		**1**					**2**			
CO2	**2**	**2**	**2**	**2**	**1**										
CO3	**2**	**1**	**2**	**2**	**1**						**2**	**2**			
CO4	**2**	**1**	**2**	**2**	**2**		**1**				**2**	**2**			
CO5	**2**	**1**	**2**	**2**	**3**		**2**				**3**	**3**			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80512	**DATABASE MANAGEMENT SYSTEMS** (Open Elective)	**L**	**T**	**P**
Credits: 3		**3**	**-**	**-**

Prerequisites: NIL

Course Objectives:

This course enables the students to learn the basic concepts and the applications of Data Base Systems and conceptualize and depict a Data Base System using ER diagram, masterin constructing queries using SQL. Using this course student can understand relational database principles, become familiar with the basic issues of transaction processing and concurrency control and Data Base storage structures and access techniques.

MODULE I: Introduction **10 Periods**

Database System Applications, Purpose of Database Systems, View of Data, Database Languages – DDL, DML, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database Users and Administrators, History of Database Systems.

Introduction to Data base design: Database Design and ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises.

Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design: ER to Relational, Introduction to Views, Destroying /Altering Tables and Views.

MODULE II: Relational Algebra and Calculus **9 Periods**

Preliminaries, Relational Algebra, Relational calculus – Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and calculus.

SQL: Queries, Constraints, Triggers: Form of Basic SQL Query, UNION, INTERSECT, and EXCEPT, Nested Queries, Aggregate Operators, NULL values Complex Integrity Constraints in SQL, Triggers and Active Data bases, Designing Active Databases.

MODULE III: Schema Refinement and Normal Forms **10 Periods**

A:Schema Refinement - Introduction to Schema Refinement, Functional Dependencies - Reasoning about FDs,

B:Normal Forms- Properties of Decompositions, Normalization, Schema Refinement in Database Design, Other Kinds of Dependencies.

MODULE IV: Transaction Management and Concurrency Control **10 Periods**

Transaction Management:-Transactions, Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation,

Serializability, Transaction Isolation and Atomicity Transaction Isolation Levels, Implementation of Isolation Levels.

Concurrency Control: Lock–Based Protocols, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Multiversion Schemes.

Recovery System-Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with loss of nonvolatile storage, Early Lock Release and Logical Undo Operations, Remote Backup systems..

MODULE V: Storage and Indexing **9 Periods**

Storage - Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing, Index Data Structures, Comparison of File Organizations.

Tree-Structured Indexing: Intuition for tree Indexes, Indexed Sequential Access Method (ISAM), B+ Trees: A Dynamic Index Structure, Search, Insert, Delete.

Hash Based Indexing: Static Hashing, Extendible hashing, Linear Hashing, Extendible vs. Linear Hashing.

Text Books

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw Hill Education (India) Private Limited, 3rd Edition.
2. Data base System Concepts, A. Silberschatz, Henry. F. Korth, S. Sudarshan, McGraw Hill Education(India) Private Limited l, 6th edition

References

1. Database Systems, 6th edition, R Elmasri, ShamkantB.Navathe, Pearson Education.
2. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning.
3. Introduction to Database Management, M. L. Gillenson and others, Wiley Student Edition.
4. Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group.
5. Introduction to Database Systems, C. J. Date, Pearson Education.

E-Resources

1. https://kakeboksen.td.org.uit.no/Database%20System%20Concepts%206th%20edition.pdf
2. http://agce.sets.edu.in/cse/ebook/DBMS%20BY%20RAGHU%20RAMAKRISHNAN.pdf
3. http://airccse.org/journal/ijdms/ijdms.html
4. http://www.springer.com/computer/database+management+%26+information+retrieval?SGWID=0-153-12-114576-0
5. http://textofvideo.nptel.iitm.ac.in/video.php?courseId=106106093
6. http://www.nptelvideos.in/2012/11/database-management-system.html

Course Outcomes

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

1. Identify the basic elements of a relational database management system and the data models for relevant problems.
2. Write SQL Queries by designing entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data.
3. Analyze various functional dependencies and apply normalization for designing a robust data base in the development of application software.
4. Implement transactions, concurrency control, recovery and Query optimization techniques.
5. Compare various indexing and hashing techniques.

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

COS	Programme Outcomes(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	2	2			3				2		3			
CO2	3	3	3			3				3		3			
CO3	3	3	3			2				3		2			
CO4	3	2	1			1				1		1			
CO5	3	1	1			1						1			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80521	BIG DATA ANALYTICS (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Databases, Programming fundamentals.

Course Objectives

This course enables the students to learn and understand Big data, data analytics, R language, developing map reduce programs, discuss about concepts of big data, make use of Hadoop concepts for designing applications, develop applications using Hadoop I/O and analyze big data using programming tools such as Pig and Hive.

MODULE I: Big data overview, data analytics, and R Language 9 Periods

Big Data Overview: Data Structures, Analyst Perspective on Data Repositories, State of the Practice in Analytics, Bl Versus Data Science, Current Analytical Architecture, Drivers of Big Data, Emerging Big Data Ecosystem and a New Approach to Analytics, Key Roles for the New Big Data Ecosystem, Examples of Big Data Analytics. Data Analytics Lifecycle, Model Building and Basic Data Analytic Methods Using R Data Analytics Lifecycle Overview, Key Roles for a Successful Analytics Project, Background and Overview of Data Analytics Lifecycle - Discovery, Data Preparation, Learning the Business Domain, Model Planning, Model building, Communicate Results, Operationalize and case study example Global Innovation Network and Analysis (GINA)

R Introduction: Introduction to R, Exploratory Data Analysis, Statistical Methods for Evaluation, Hypothesis Testing, Difference of Means, Rank-Sum Test, Errors, Sample Size data

MODULE II: Working with Big Data 9 Periods

Hadoop - Google File System, Hadoop Distributed File System (HDFS)– Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker).

Configuring of Hadoop Cluster - Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

MODULE III: Hadoop API and Map Reduce Programs 9 Periods

A: Hadoop API - Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New)

B: MapReduce Programs with classes - Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner.

MODULE IV: Hadoop I/O and Implementation 9 Periods

Hadoop I/O - The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections.

Implementation - Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators.

MODULE V: PIG and HIVE HADOOP TOOL **12 Periods**

PIG - HADOOP TOOL - Hadoop Programming Made Easier - Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin.

HIVE – HADOOP TOOL - Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

Text Books

1. Data Science & Big Data Analytics Discovering, Analyzing, Visualizing and Presenting Data EMC Education Services, Wiley Publishers, 2015.
2. Cay Horstmann, Wiley John Wiley & Sons, "**Big Java**", 4th Edition, INC
3. Tom White, "**Hadoop: The Definitive Guide**" 3rd Edition, O'reilly

References

1. Alex Holmes, "**Hadoop in Practice**", MANNING Publications.
2. Srinath Perera, Thilina Gunarathne, "**Hadoop MapReduce**" Cookbook.

E-Resources

1. http://newton.uam.mx/xgeorge/uea/Lab_Prog_O_O/materiales_auxiliares/Big_Java_4th_Ed.pdf
2. http://www.isical.ac.in/~acmsc/WBDA2015/slides/hg/Oreilly.Hadoop.The.Definitive.Guide.3rd.Edition.Jan.2012.pdf-
3. https://static.googleusercontent.com/media/research.google.com/en//archive/mapreduce-osdi04.pdf
4. http://www.comp.nus.edu.sg/~ooibc/mapreduce-survey.pdf
5. http://freevideolectures.com/Course/3613/Big-Data-and-Hadoop/18
6. http://freevideolectures.com/Course/3613/Big-Data-and-Hadoop/40

Course Outcomes

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

1. Develop simple applications using R language
2. Analyze file systems such as GFS and HDFS.
3. Design applications by applying Map reduce concepts.
4. Build up programs by making use of I/O.
5. Explore and inspect the big data using programming tools like Pig and Hive.

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

COS	Programme Outcomes(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	3	3	3	3	1		1	3	2	1	3			
CO2	3	2	3	3	3						2	1			
CO3	3	3	3	3	3							3			
CO4	3	3	3	3	3						1	3			
CO5	2	3	3	3	3						1	3			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80535	CLOUD COMPUTING (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Computer Networks

Course Objectives:

This course provides the students to gain knowledge in the cloud computing environment, security architecture and development of cloud services. Students will also examine the collaboration of real time cloud services and analyze the case studies from various cloud development tools.

MODULE I: Introduction to Cloud Computing **8 Periods**

Cloud Computing in a Nutshell, System Models for Distributed and Cloud Computing, Roots of Cloud Computing, Grid and Cloud, Layers and Types of Clouds, Desired Features of a Cloud, Basic Principles of Cloud Computing, Challenges and Risks, Service Models.

MODULE II: Virtualization **12 Periods**

Virtual Machines and Virtualization of Clusters and Data Centers: Levels of Virtualization, Virtualization Structures//Tools and Mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization Data-Center Automation.

Case studies: Xen Virtual machine monitors- Xen API. VMware - VMware products-VMware Features. Microsoft Virtual Server - Features of Microsoft Virtual Server.

MODULE III: Cloud Computing Architecture over Virtualized Data Centers **8 Periods**

A:Data-Center design and Interconnection networks, Architectural Design of Compute and Storage Clouds.

B: Public Cloud Platforms, GAE, AWS, Azure, Inter-cloud Resource Management.

MODULE IV: Cloud Security **8 Periods**

Cloud Security and Trust Management, Data Security in the Cloud : An Introduction to the Idea of Data Security, The Current State of Data Security in the Cloud, Crypt Db:Onion Encryption layers-DET,RND,OPE,JOIN,SEARCH, HOM, and Homomorphic Encryption, FPE. Trust, Reputation and Security Management.

MODULE V: Cloud Programming and Standards **12 Periods**

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, parallel and distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

Common Standards in Cloud Computing: The Open Cloud Consortium, the Distributed Management Task Force, Standards for Application Developers, Standards for Messaging. Internet Messaging Access Protocol (IMAP), Standards for Security, Examples of End-User Access to Cloud Computing.

Text Books

1. John W. Rittinghouse, "**Cloud Computing: Implementation, Management, and Security** ". James F. Ransome, CRC Press 2009.
2. Kai Hwang. Geoffrey C.Fox, Jack J. Dongarra, "**Distributed and Cloud Computing From Parallel Processing to the Internet of Things**", Elsevier, 2012.
3. Rajkumar Buyya, James Broberg and Andrzej M. Goscinski," **Cloud Computing: Principles and Paradigms (Wiley Series on Parallel and Distributed Computing),** Wiley Publishing ©2011

References:

1. Raluca Ada Popa, Catherine M.S. Redfield, Nickolai Zeldovich, and Hari Balakrishnan, "**CryptDB: Protecting Confidentiality with encrypted Query Processing**"23rd ACM Symposium on Operating Systems Principles (SOSP 2011), Cascais, Portugal October 2011.
2. Craig Gentry,"**A Fully Homomorhic Encryption Scheme**", September 2009.
3. David Marshall, Wade A. Reynolds, "**Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center**", Auerbach Publications, 2006.

E-Resources

1 http://www.motc.gov.qa/sites/default/files/cloud_computing_ebook.pdf
2 https://www.thesisscientist.com/docs/Study%20Notes/8ad50655-64f5-46d4-bc89-0c02feaf132f
3 http://ndl.iitkgp.ac.in/document/zyMnqgZQXCJME6wgSqrU87VCGcelOw5mZ-5ybmrhKBj79VQPP0_ZQHLqcOopPDoaFWhZybCrPg_joTbBU8ZpGA
4 http://nptel.ac.in/courses/106106129/28

Course Outcomes

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

1. Understand the cloud enabling technologies and the Cloud service models.
2. Choose the levels of virtualization and tools for resource provisioning.
3. Compare the cloud platform architectures of virtualized data centers and Inter-cloud Resource Management.
4. Analyze the principles of Security and Trust management to protect confidentiality of data in the Cloud.
5. Propose the standards of Parallel and Distributed Programming Paradigms for improving user Access to Cloud Computing.

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

COS	Programme Outcomes(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	1				2										
CO2		1		2	2							1			
CO3		1			3							2			
CO4	1											2			
CO5	1			2								1			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80605	ANDROID APPLICATION DEVELOPMENT (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives:

This course aims the students to learn the essentials of mobile apps development, aids in developing simple android applications, identify the essentials of android design, file settings, study about user interface design and develop android APIs.

Module I: Mobile and Information Architecture **10 Periods**

Introduction to Mobile: A brief history of Mobile, The Mobile Eco system, Why Mobile?, Types of Mobile Applications.

Mobile Information Architecture: Mobile Design, Mobile 2.0, Mobile Web development, Small Computing Device Requirements.

Module II **10 Periods**

Introduction to Android: History of Mobile Software Development, The Open Handset Alliance-Android platform differences.

Android Installation: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building a Sample Android application.

Module III **10 Periods**

A: Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents.

B: Android File Settings: Android Manifest File and its common settings, Using Intent Filter, Permissions, Managing Application resources in a hierarchy, working with different types of resources.

Module IV **9 Periods**

Android User Interface Design: Essentials User Interface Screen elements, Designing User Interfaces with Layouts.

Animation Techniques: Drawing and Working with Animation- Drawing on the screen –Working with Text-Working with Bitmaps-Working with shapes-Working with animation.

Module V **9 Periods**

Android APIs-I: Using Common Android APIs Using Android Data and Storage APIs, Managing data using SQLite, Sharing Data between Applications with Content Providers.

Android APIs-II : Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

Text Books

1. James Keogh, **"J2ME: The Complete Reference"**, Tata McGrawHill.
2. Lauren Darcey and Shane Conder, **"Android Wireless Application Development",** Pearson Education, 2nd ed. (2011).

References

1. Reto Meier, **"Professional Android 2 Application Development",** Wiley India Pvt Ltd.
2. Mark L Murphy, **"Beginning Android"**, Wiley India Pvt Ltd.
3. Barry Burd, **"Android Application Development All in one**" Edition: I, Wiley India Pvt Ltd.

E Resources

1. http://onlinevideolecture.com/ebooks/?subject=Android-Development
2. https://developer.android.com/training/basics/firstapp/index.html
3. IEEE Transactions on Mobile Computing
4. International Journal of Interactive Mobile Technologies
5. http://nptel.ac.in/courses/106106147/

Course Outcomes

On successful completion of the course, a student will be able to:

1. Classify different types of Platforms.
2. Appreciate the Mobility landscape.
3. Familiarize with Mobile apps development aspects.
4. Design and develop mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications.
5. Perform testing, signing, packaging and distribution of mobile apps.

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**	**3**													
CO2			**3**		**3**										
CO3			**3**		**3**										
CO4				**2**			**1**								
CO5							**1**		**3**			**3**			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80606	PYTHON PROGRAMMING (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Nil

Course Objectives:

This course enables the students to understand the fundamentals of python programming, describe the various operators and control flow statements, analyze various data structures, make use of functions, discuss about MODULEs, packages in python, object oriented concepts, exception handling, illustrate advanced concepts like multithreading, graphics and generate various test cases.

MODULE I: Python Programming-Introduction **9 Periods**

Introduction- History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL (Shell) Running Python Scripts.

Data Types - Variables, Assignment, Keywords, Input-Output, Indentation-Types - Integers, Strings, Booleans.

MODULE II: Operators and Expressions **9 Periods**

Operators - Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators.

Expressions - Expressions and order of evaluations Control Flow- if, if-elseif-else, for, while, break, continue.

MODULE III: Data Structures and Functions **10 Periods**

A: Data Structures - Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences, Comprehensions.

B: Functions - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful, Functions (Function Returning Values) Scope of the Variables in a Function - Global and Local Variables.

MODULE IV: MODULEs, Packages and Exception handling **10 Periods**

MODULEs - Creating MODULEs, import statement, from. Import statement; name spacing, Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor, Method, Inheritance, Overriding Methods, Data hiding.

Error and Exceptions - Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions

MODULE V: Library functions and testing **10 Periods**

Brief Tour of the Standard Library - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics.

Testing - Why testing is required?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

Text Books

1. Vamsi Kurama, "**Python Programming: A Modern Approach**", Pearson Publications.
2. Mark Lutz," **Learning Python**", Orielly Publishers

References

1. Allen Downey, "**Think Python**", Green Tea Press
2. W. Chun, "**Core Python Programming**", Pearson.
3. Kenneth A. Lambert, "**Introduction to Python**", Cengage

E–Resources

1. http://kvspgtcs.org/wp-content/uploads/2013/08/Python-Programming-for-the-Absolute-Beginner.pdf 2
2. http://www.bogotobogo.com/python/files/pytut/Python%20Essential%20Reference,%20Fourth%20Edition%20(2009).pdf
3. https://periodicals.osu.eu/ictejournal/dokumenty/2015-02/ictejournal-2015-2-article-1.pdf
4. http://ptgmedia.pearsoncmg.com/images/9780132678209/samplepages/0132678209.pdf
5. http://www.learnerstv.com/Free-Computer-Science-Video-lectures-ltv163-Page1.htm

Course Outcomes

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

1. Understand the basics of python programming languages
2. Illustrate simple programs with control structures
3. Apply advanced concepts like data structures and make use of functions.
4. Develop simple applications by using MODULE s, packages and exception handling mechanisms.
5. Demonstrate projects that make use of libraries and generate test cases for the projects.

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**			**1**	**1**										
CO2		**1**	**1**	**3**								**-**			
CO3	**1**	**1**	**1**	**1**	**2**							**1**			
CO4											**1**	**1**			
CO5						**1**						**1**			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80617	ARTIFICIAL INTELLIGENCE	L	T	P
Credits: 3	(Open Elective)	3	-	-

Prerequisites: NIL

Course Objectives:

This course enable the students to understand the basic fundamentals of Artificial Intelligence, determine various problem solving strategies, understand the logic concepts, different approaches to represent the knowledge, develop the expert systems in various phases and its applications, apply the fuzzy logic in various problem solving techniques.

MODULE I: Introduction **10 Periods**

Introduction to artificial intelligence: Introduction ,history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of AI languages, current trends in AI

MODULE II: Problem Solving **9 Periods**

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening a*, constraint satisfaction Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games

MODULE III: Logic Concepts and Knowledge Representation **10 Periods**

A: Logic Concepts - Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic

B:Knowledge Representation - Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

MODULE IV: Expert System and Applications **10 Periods**

Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

MODULE V: Uncertainty Measure **9 Periods**

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

Text Books

1. Saroj Kaushik, "**Artificial Intelligence**", CENGAGE Learning,
2. Stuart Russel, Peter Norvig, "**Artificial intelligence, A modern Approach**", 2nd ed, PEA
3. Rich, Kevin Knight, Shiv Shankar B Nair, "**Artificial Intelligence**", 3rd Ed, TMH
4. Patterson,"**Introduction to Artificial Intelligence**", PHI

References

1. George F Lugar, **"Atificial intelligence, structures and Strategies for Complex problem solving"**, 5th edition, PEA
2. Ertel, Wolf Gang, "**Introduction to Artificial Intelligence**", Springer
3. Blay WhitBY "**Artificial Intelligence**" Rosen Publishing.

E-Resources

1. https://i4iam.files.wordpress.com/2013/08/artificial-intelligence-by-rich-and-knight.pdf
2. https://books.google.co.in/books?id=pVR9W5LEZUwC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
3. https://www.journals.elsevier.com/artificial-intelligence/
4. http://www.ceser.in/ceserp/index.php/ijai
5. http://ndl.iitkgp.ac.in/document/yVCWqd6u7wgye1qwH9xY7_M07uyea_7zp_zRG3BvdUVy2TIab45fvPeNJfynQsAbmBEgDSUqzidwcse6xwotJA
6. http://ndl.iitkgp.ac.in/document/xttk-4kfhvUwVlXBW-YWRBg_vrHK12-lgOzTVbb5oZ6eQOBjCWDfRvquHJLEOFENjI5AmOqRc9Ar3eJF4CGFrw

Course Outcomes:

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

1. Describe the key components of the artificial intelligence (AI) field.
2. Classify knowledge representation techniques.
3. Interpret various types of reasoning and processing.
4. Discover game playing and apply knowledge representation.
5. Demonstrate learning and the analyze aspects of leaning.

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			1	1										
CO2		1	1	3								-			
CO3	1	1	1	1	2							1			
CO4											1	1			
CO5						1						1			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech		
Code: 82507	DRILLING AND BLASTING (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisite: Nil

Course Objectives:
To understand the principles and mechanism of different drilling methods, novel drilling techniques. To learn the basic mechanism of rock fragmentation by blasting. To know the various types of explosives and accessories used in blasting. To learn the different methods of blasting adopted in surface and underground coal / non-coal mines including adverse effects of blasting & their control

MODULE-I: Principles of Drilling and Drill bits **10 Periods**
Principles of drilling: Principles of rock drilling, drillability, drillability index, factors affecting the drillability, selection of drills.
Drill Bits: Various types of drill bits, study of bit life, factors affecting bit life, Thrust feed and rotation

MODULE-II: Explosives **10 Periods**
Historical development, properties of explosives, low and high explosives, ANFO, slurries, Emulsion explosives, heavy ANFO, permitted explosives, testing of permitted explosives, bulk explosive systems-PMS, SMS, substitutes for explosives and their applications- hydrox, cardox, airdox.

MODULE-III: Firing of Explosives and blasting methods **10 Periods**
A: Firing of Explosives: Safety fuse, detonating cord and accessories, detonators, Exploders, Electric firing and non-electric firing, electronic detonators, NONEL blasting.
B:Blasting methods: Preparation of charge, stemming and shot firing, choice and economical use of explosives, misfires, blown out shots, incomplete detonation, their causes, prevention and remedies.

MODULE-IV: Handling of Explosives **9 Periods**
Surface and underground transport of explosives, storage and handling of explosives, magazines, accidents due to explosives, precautions and safety measures during transportation.

MODULE-V: Mechanics of blasting and effects of blasting **9 Periods**
Mechanics of blasting: Factors affecting rock breakage using explosives, theory of shaped charge, detonation pressure, coupling, shock waves impedance, critical diameter.
Effects of blasting: Vibrations due to blasting and damage criteria, fly rocks, dust, fumes, water pollution and controlled blasting.

Text Books

1. Blasting in ground excavations and mines, Roy Pijush Pal, Oxford and IBH, 1st ed 1993
2. Drilling technology handbook, C.P. Chugh, Oxford and IBH, 1st ed, 1977 .

References

1. Rock blasting effect and operation, Roy Pijush Pal, A.A. Balkema, 1st ed, 2005
2. Elements of mining technology, Vol-1, D.J. Deshmukh, Central techno, 7th ed, 2001
3. Blasting operations, B.Hemphill Gary, Mc-graw Hill, 1st ed 1981
4. Explosive and blasting practices in mines, S.K.Das, Lovely prakashan, 1st ed, 1993.

E - Resources:

1. http://technology.infomine.com/reviews/blasting/welcome.asp?view=full
2. https://miningandblasting.wordpress.com/list-of-technical-papers/

Course Outcomes:

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

1. Understand Principles of drilling and Various types of drill bits
2. Understand different types of Explosives
3. Understand Firing of Explosives and Blasting methods
4. Understand Handling of Explosives
5. Understand Mechanics of blasting and effects of blasting

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**	**3**	**1**	**2**	**1**				**3**						
CO2	**2**	**2**	**1**	**1**	**3**				**2**						
CO3	**3**	**2**	**3**	**3**	**2**				**1**						
CO4	**1**	**3**	**2**	**1**	**2**				**2**						
CO5	**1**	**1**	**2**	**2**	**1**				**2**						

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech		
Code: 82537	MATERIAL HANDLING (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisite: NIL

Course Objectives:
To introduce the basic principles in material handling and its equipment. To study the conveyor system and its advancement

MODULE-I: Bulk Handling Systems 10 Periods
Basic principles in material handling exclusive to mining industry and its benefits. Classification of material handling equipments. Current state of art of bulk handling materials in mining in the world and Indian scenario; Selection of suitable types of systems for application. Stacking, blending, reclaiming and wagon loading, machinery and systems used at the stack yards; stock piles, silos, bunkers – their design, reclamation from them, various types of weigh bridges. Segregation - size wise and grade wise, Railway sidings.

MODULE-II: Short Conveyors and Haulage Systems 10 Periods
Roller conveyor, overhead conveyor, screw conveyor, auger conveyor, apron feeder, bucket elevators, scraper haulage, conveyors in steep gradient, Armoured face conveyor, Off-highway Trucks, haul roads, In-pit crushers and modular conveyors, electric trolley assisted haulage, shuttle cars, skip hoist, winders, LHD's, pneumatic conveying, hydraulic transport.

MODULE-III: Belt Conveyor System 9 Periods
A:Design, capacity, calculations with respect to the size, speed, troughing, power requirement, tension requirement, belt selection, factor of safety.
B: Developments in the design, of various components of belt conveyor systems such as; structures, rollers, gear boxes and motors, drums and pulleys, belting, ancillary components and safety gadgets.

MODULE-IV: New Types of Belt Conveyor Systems 9 Periods
Curved conveyors, cable belts, pipe conveyors, rock belts – mine-run-rock conveyor, steel belt conveyors, steel slot conveyor, chain belt conveyors, etc., and other new developments, stackers and reclaimers, High Angle Conveyors (HAC); New inventions in HAC , Mobile or fixed installations; Woven wire belts, En Masse conveyor, Vibrating conveyor, gravity bucket conveyor.

MODULE-V: Material Handling in Mines, Plants and Worksho 10 Periods
Mobile cranes, derrick cranes, pillar cranes, tower cranes, radial cranes, bridge cranes, fork lifters, overhead gantry material handling in workshops. Mineral handling in dimensional stone quarries, Mineral handling plants(coal, etc.,) Locomotives, rail tracks, rail cars, railways wagons; Aerial ropeways, gravity ropeways; Containers and shipping; Rope haulage - different types.

Text Books

1. Allegri (Sr.), T.H., Material Handling – Principles and Practices, CBS Publishers and Distributors, Delhi, 1987.
2. Hustrulid, W., and Kuchta, M. Open Pit Mine Planning & Design, Vol. 1, Fundamentals, Balkema, Rotterdam, 1998.

References

1. Kennedy, B.A., Surface Mining – 2nd Edition, SME, New York, 1990.
2. Deshmukh, D.J., Elements of Mining Technology, Vol.I, II and III, EMDEE Publishers, Nagpur, 1979.
3. Peng, S.S., and Chiang, H.S., Longwall Mining, John Wiley and Sons, New York, 1984.
4. Hartman, H.L., (Ed.), SME Mining Engg. Handbook Vol.I and II, Society for Mining,
5. Metallurgy, and Exploration, Inc., Colorado, 1992.

E- Resources

1. www.bmt.org
2. www.canadianminingjournal.com/tag/material-handling/

Course Outcomes

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

1. Understand Basic principles in material handling exclusive to mining industry and its benefits
2. Understand Short Conveyors and Haulage Systems
3. Understand Belt Conveyor System
4. Understand New Types of Belt Conveyor Systems
5. Understand Material Handling in Mines, Plants and Workshops

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						1				
CO2	1	1	2	2	1						2				
CO3	1	2	3	3	2						2				
CO4	2	2	1	2	3						3				
CO5	2	2	1	2	3						2				

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech		
Code: 82542	TUNNELING ENGINEERING (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisite: NIL

Course Objectives:

The course enables the students to be familiar with the recent developments in various technologies used in underground spaces includes tunneling and cavern projects across the world.

MODULE-I: Introduction **10 Periods**

Scope and application, historical developments, art of tunneling, tunnel engineering, future tunneling considerations. Types of Underground Excavations: Tunnel, adit, decline, shaft; parameters influencing location, shape and size; geological aspects; planning and site investigations.

MODULE-II: Tunnel Excavations **10 Periods**

Tunneling Methods: Types and purpose of tunnels; factors affecting choice of excavation technique; Methods - soft ground tunneling, hard rock tunneling, shallow tunneling, deep tunneling; Shallow tunnels – cut and cover, cover and cut, pipe jacking, jacked box excavation techniques, methods of muck disposal, supporting, problems encountered and remedial measures.

MODULE-III: Drilling and Blasting **10 Periods**

A:Drilling - drilling principles, drilling equipment, drill selection, specific drilling, rock drillability factors; Blasting - explosives, initiators, blasting mechanics

Part B: Types of cuts- fan, wedge and others; blast design, tunnel blast performance - powder factor, parameters influencing, models for prediction; mucking and transportation equipment selection.

MODULE-IV: Mechanization **9 Periods**

Tunneling by Road headers and Impact Hammers: Cutting principles, method of excavation, selection, performance, limitations and problems. Tunneling by Tunnel Boring Machines: Boring principles, method of excavation, selection, performance, limitations and problems; TBM applications.

MODULE-V: Tunnel Services **9 Periods**

Supports in Tunnels: Principal types of supports and applicability. Ground Treatment in Tunneling: Adverse ground conditions and its effect on tunneling; Excavation of large and deep tunnels, caverns. Tunnel Services: Ventilation, drainage and pumping; Tunneling hazards.

Text Books

1. Hudson, J.A., Rock Engineering Systems – Theory and practice, Ellis Horwood, England.
2. Clark, G.B., (1987), Principles of Rock Fragmentation, John Wiley and Sons, New York.

References

1. Legget, R.F., Cities and Geology, McGraw-Hill, NewYork, 624 p., 1973.
2. Johansen, John and Mathiesen, C.F., Modern Trends in Tunnelling and Blast Design, AA Balkema, 154p, 2000.
3. Per-Anders Persson, Roger Holmberg, Jaimin Lee, (1993), Rock blasting and explosives Engineering, CRC Press, p.560.
4. Bickel, J.O., Kuesel, T.R. and King, E.H., Tunnel Engineering Handbook, Chapman & Hall Inc., New York and CBS Publishers, New Delhi, 2nd edition, Chapter 6, 544p, 1997.

E-Resources

1. www.cowi.com/.../bridgetunnelandmarinestructures/tunnels/.../021-1700-020e-10b_
2. https://miningandblasting.wordpress.com/list-of-technical-papers/

Course Outcomes

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

1. Understand art of tunneling, tunnel engineering, future tunneling considerations
2. Understand different types Tunneling Methods
3. Understand drilling principles, drilling equipment, explosives, initiators, blasting mechanics
4. Understand tunneling by different machines
5. Understand Tunnel Services

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**	**3**	**1**	**2**	**3**					**2**					
CO2	**2**	**3**	**1**	**2**	**3**										
CO3	**2**	**3**	**1**	**2**	**3**										
CO4	**2**	**3**	**1**	**2**	**3**					**3**					
CO5	**2**	**3**	**1**	**2**	**3**										

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech.		
Code: 80H07	ENGLISH LANGUAGE SKILLS	L	T	P
Credits: 3	(Open Elective)	3	-	-

Prerequisite: Nil

Course Objectives:

To build business English vocabulary and grammar through lessons on the latest topics in the business world and to upgrade the learners communication and presentation skills and make the students competent in communication at an advanced level. In addition to the earlier mentioned, this course gives a room to groom the learners' personality and make the students self-confident individuals by mastering inter-personal skills, team management skills, and leadership skills by giving hands-on experience about business presentations and attending team meetings.

Module – I: Communication Skills **10 Periods**

Types of communication-Oral, aural and written, reading-Word Power-Vocabulary-technical vocabulary, Rate of speech- pitch, tone-clarity of voice.

Module – II: Conversation Skills **10 Periods**

Informal and Formal conversation, Verbal and Non - verbal communication. Barriers to effective communication - Kinesics

Module – III: Reading Skills **10 Periods**

A: Types of reading–reading for facts, guessing meaning from context,

B: Strategies of reading- scanning, skimming, inferring meaning, critical reading.

Module – IV: Creative Writing **9 Periods**

Letter-writing-business letters-pro forma culture-format-style-effectiveness, promptness-Analysis of sample letters collected from industry-email, fax, Essay writing-nuances of essay writing, types of essays,

Module - V: Writing Skills **9 Periods**

Characteristics of writing – mechanics of writing – methodology of writing – format & style- structures of writing – circular writing – memo writing – instructions writing, Report Writing, SOP.

References

1. Rajendra Pal S Korlaha ,**Essentials of Business Communication**, Hi: Sultan Chand & Sons, New Delhi.
2. Andrew J. Rutherford , **Basic Communication Skills for Technology**,: Pearson Education Asia, Patparganj, New Delhi-92.

3. V. Prasad, **Advanced Communication skills**, Atma Ram Publications, and New Delhi.
4. Raymond V. Lesikav; John D.Pettit Jr.; **Business Communication: Theory & application**, All India Traveler Bookseller, New Delhi-51
5. R K Madhukar, **Business Cimmunication**, Vikas Publishing House Pvt Ltd

E-Resources

1. https://blog.udemy.com/types-of-communication/ (Communication Skills)
2. https://www.skillsyouneed.com/ips/conversational-skills.html (Conversation Skills)
3. http://lrs.ed.uiuc.edu/students/jblanton/read/readingdef.htm (Reading Skills)
4. https://www.thoughtco.com/what-is-composition-english-1689893 (Writing and composition)
5. http://www.mansfield.edu/fye/upload/Academic-Reading-Skills.pdf (Reading Skills)
6. https://www.youtube.com/watch?v=cQruENyLNYI&list=PLbMVogVj5nJSZB8BV29_sPwwkzMTYXpaH (Communication Skills)

Course Outcomes

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

1. Understand the importance of various forms of non-verbal communication.
2. Participate confidently in business meetings.
3. Gain an understanding about different types of reading skills and employ the same during competitive exams.
4. Recognize the importance of writing in real time situations.
5. Improve the skills necessary to meet the challenge of using English in the business world.

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			
CO2						1			2		1	2			
CO3		2		1											
CO4											1	2			
CO5											1	3			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B. Tech.		
Code: 80H08	INTERPRETATION SKILLS AND ANALYTICAL WRITING	L	T	P
Credits: 3	(Open Elective)	3	-	-

Prerequisite: Nil

Course Objectives:

To determine how well the students can develop a compelling argument in writing for an academic audience. Further helps them to involve in critical thinking and persuasive writing exercises. This course also intends to develop effective writing skills to analyze and evaluate the data and ideas for better comprehension. On the other hand this course encourages students to learn strategies for becoming accurate readers and critical analysts.

Module – I: Interpretation and Types of Reading **10 Periods**

- Interpretation in different settings
- Understanding the main ideas in the text
- Reading for inference
- Reading for theme
- Reading for interpretation

Module –II: Approaches to Reading **10 Periods**

- Biographical
- Historical
- Gender
- Sociological

Module – III: Critical Reading **10 Periods**

- The Theme
- Setting
- Point of View
- Characters
- Plot
- Analysis
- Interpretation

  Note: This module should be dealt with reference to *Animal Farm* by George Orwell

Module - IV: Analytical Writing **9 Periods**

- Argumentation
- Sequencing
- Analyze an ISSUE
- Analyze an Argument
- Verbal Reasoning
- Interpretive Reports

Note: This module should be dealt with reference to Essays written by Somerset Maugham/ Russell/Aldous Huxley

Module – V: Creative Writing **9 Periods**

- Figurative Language
- Imagery
- Writing a short Poem
- Writing a short Story

References

1. GRE by CliffsTestPrep-7th edition
2. GRE Exam- **A Comprehensive Program**
3. M H Abraham **Glossary of English Literary terms**
4. GD Barche **Interpreting Literature- A Myth and a Reality**
5. Wilbur Scott- **Five approaches to literary criticism**.

E-Resources

1. http://www.brad.ac.uk/staff/pkkornakov/META.htm(Introduction to Interpretation Skills)
2. http://literacyonline.tki.org.nz/Literacy-Online/Planning-for-my-students-needs/Effective-Literacy-Practice-Years-1-4/Approaches-to-teaching-reading (Approaches to Reading)
3. https://www.csuohio.edu/writing-center/critical-reading-what-critical-reading-and-why-do-i-need-do-it (Critical Reading)
4. https://www.ets.org/gre/revised_general/about/content/analytical_writing (Analytical Writing)
5. http://www.writerstreasure.com/creative-writing-101/ (Creative Writing)
6. http://scholarworks.rit.edu/jcws/aimsandscope.html (Creative Writing)

Course Outcomes:

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

1. Think critically and help in writing analytically.
2. Get real life experiences through interpretation of literature.
3. Learn strategies for becoming accurate readers and critical analysts
4. Think logically towards social, political, economical, legal and technological issues.
5. Draw their career vision and mission independently.

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		1	2				
CO2										2	1				
CO3			1			2	1			1					
CO4						1		2				1			
CO5				1		1						1			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80H09	**ENGLISH FOR ACADEMIC AND RESEARCH WRITING** (Open Elective)	**L**	**T**	**P**
Credits: 3		**3**		**-**

Prerequisite: Nil

Course Objectives:

This paper helps the students use pre-writing strategies to plan writing. Further it improves writing through the process of drafting essays, reports, abstracts, etc. In addition to this, it improves accuracy and complexity of Sentence structure in academic writing. On the other hand the student will be able to analyze and interpret data . This course also intends to develop research skills to identify and incorporate relevant resources for research writing.

Module I Features of Academic Writing **9 Periods**

Language: Clear, Correct, Concise, Inclusive language

Tone: Formal, Objective, Impersonal, Cautious tone

Style: Appropriate, Accurate, Organized, Empirical style

Ethics: Honesty, Integrity, Responsibility, Accountability

Module II Kinds of Academic Writing **9 Periods**

Essays, Reports, Reviews, SOPs, Abstracts, Proposals

Module III Academic Writing Skills **10 periods**

- Paraphrasing
- Summarizing
- Quoting
- Rewriting
- Expansion

Module IV Research Process **10 periods**

Selection of Topic, Formulation of Hypothesis, Collection of Data, Analysis of Data, Interpretation of Data, Presentation of Data

Module V Structure of a Research Document **10 periods**

Title, Abstract, Introduction, Literature Survey, Methodology, Discussion, Findings/Results, Conclusion, Documenting Sources

References

1. Zemach, D. & Rumisek, L. 2005.*Academic Writing: from Paragraph to Essay*, Oxford, Macmillan
2. Swales, J. & Feak, C. 2004. *Academic Writing for Graduate Students: Essential Tasks and Skills*. Ann Arbor, University of Michigan Press.
3. Sword, H. 2012. *Stylish Academic Writing*, Cambridge, MA. Harvard University Press.
4. Williams, J.M. & Bizup, J. 2014.*Style: Lessons in Grace and Clarity*.11th ed. Boston, Pearson
5. Weissberg, R. & Buker, S. 1990.Writing up *Research: Experimental Research Report Writing for Students of English* Englewood Cliffs, Prentice Hall Regents.
6. Englander, K. 2014. *Writing and Publishing Science Research Papers in English: A global perspective*. Heidelberg. Springer Briefs in Education

E- Resources

1. https://writing.wisc.edu/Handbook/index.html
2. https://brians.wsu.edu/common-errors/
3. http://www.gutenberg.org/ebooks/37134
4. http://nptel.ac.in/courses/110105091/2 **(Research writing)**
5. http://nptel.ac.in/courses/109106094/26**(Academic Writing and Linking Words)**
6. https://www.researchgate.net/journal/14751585_Journal_of_English_for_Academic_Purposes
7. https://www.sciencedirect.com/journal/journal-of-english-for-academic-purposes/v ol/7/issue/2

Course Outcomes

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

1. Write effective and appropriate introduction and conclusion
2. Use a wide range of academic words correctly and appropriately.
3. Write a variety of effective sentences that contain appropriate cohesive devices, connectors and transition words.
4. Identify relevant outside source material and integrate it appropriately in writing.
5. Find out results and draw conclusions for research documentation.

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			2	2				
CO2										2	1	1			
CO3				1	1					1	2	1			
CO4		1	1								1				
CO5				2		1				2	2				

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80B11	COMPUTATIONAL MATHEMATICS	L	T	P
Credits: 3	(Open Elective)	3	-	-

Prerequisite: Basic Calculus

Course Objectives:

The objective of this course is to introduce various numerical techniques which are indispensable tools to solve many algebraic and transcendental equations. Various methods are used to reduce the global error involved in approximations. This course fills into this perceived need. The treatment should be informed by the fact that not only conceptual but also (and in some cases) more importantly numerical or computational methods are of essence.

Module – I: Algebraic and Transcendental Equations 9 Periods

Solution of Algebraic and Transcendental Equations: Introduction - Bisection Method - Method of False Position - Iteration Method – Newton-Raphson Method - Ramanujan's Method. Jacobi – Gauss Seidel Methods for solving linear systems, Power Method.

Module – II: Interpolation 10 Periods

Introduction, Errors in Polynomial Interpolation, 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 – III: Curve fitting, Numerical Differentiation & Integration 10 Periods

A: Curve fitting: Fitting a first degree (linear) and second degree (parabola), exponential, power curves for a data by the Method of least squares.

B: Numerical Differentiation: Evaluation of derivatives, Evaluation of maximum & minimum for a given data. Numerical Integration: Trapezoidal Rule, Simpson's $1/3^{rd}$, $3/8^{th}$ Rule.

Module – IV: Numerical solution of Ordinary Differential Equations 10 Periods

Solution by Taylor's series method - Picard's Method of successive Approximations - Euler's Method-Modified Euler's Method – Runge-Kutta Methods. Predictor-Corrector Methods: Milne's method - Adams- Bashforth Method.

Module – V: Numerical Solution of Partial Differential Equations 9 Periods

Classification of second order equations – Finite difference approximations to derivatives - standard 5 point formula – diagonal 5 point formula – solution of Laplace equation.Solution of poisson's equation. Solution of one dimensional heat, wave equations (by Crank-Nicolson explicit/implicit formula only).

Text Books

1. Atkinson & Han, Elementary Numerical Analysis, 3^{rd} Edition,Wiley Publications.

2. Francis Scheid, Numerical Analysis, Schaum's Outlines, 2nd Edition, Tata Mc. Graw Hill Publications.

References

1. M K Jain, et.al, Numerical Methods for Scientific and Engineering Computation, New Age International Publishers.
2. James F Epperson, An Introduction to Numerical Methods and Analysis, Revised Edition, Wiley Publications.
3. V Rajaraman, Computer Oriented Numerical Methods, 3rd Edition, Pritice Hall India.
4. M K Jain, SRK Iyyengar, Numerical Methods for Scientific and Engineering Computation, 4th Edition, Newage International Publishers.
5. S S Sastry, Introductory Methods of Numerical Analysis, 5th Edition, Printice Hall India.

E-Resources

1. http://www.simumath.com/library/book.html?code=Alg_Equations_Examples (Algebraic and transcendental equation text book by YURG BERENGARD)
2. http://jupiter.math.nctu.edu.tw/~smchang/9602/NA_lecture_note.pdf (Interpolation)
3. http://www.sam.math.ethz.ch/~hiptmair/tmp/NPDE10.pdf (Numerical Solution of Partial Differential Equations)
4. https://www.jstor.org/stable/27953736?seq=1#page_scan_tab_contents (Algebraic and transcendental equation by William L. Schaaf)
5. http://nptel.ac.in/courses/111107063 (Numerical solution of Ordinary Differential Equations)
6. http://nptel.ac.in/courses/111105038 (Numerical Solution of Partial Differential Equations)

Course Outcomes

After completion of this course, students will be able to

1. Apply numerical methods to solve some algebraic and transcendental equations to the desired level of accuracy.
2. Application of interpolation concept to evaluate missed data in data analysis.
3. Application of least squares method to solve data analysis problems and able to find the differentiation and integration by using numerical techniques.
4. Apply differential equations in engineering oriented problems and to observe patterns by using numerical techniques.
5. To find out the Numerical solution of partial differential equations.

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	2	3	2				3			2			
CO2	3	3	2	3	3				3			2			
CO3	3	3	2	3	2				2			2			
CO4	3	3	2	2	3				3			2			
CO5	3	3	2	3	2				3			2			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80B12	APPLIED STATISTICS	L	T	P
Credits: 3	(Open Elective)	3	-	-

Prerequisite: Basic concepts of statistics

Course Objectives:

Uncertainty is found everywhere. It is therefore essential to understand the techniques for handling and modeling it. This course is meant to provide a grounding in Statistics and foundational concepts that can be applied in modeling processes and decision making. These would come in handy for the prospective engineers in most branches.

Module - I: Analysis of Variance & Analysis of Co-variance **10 Periods**

Analysis of Variance (ANOVA): one-way & two-wav ANOVA and multiple comparisons. Design of Experiments: Importance and applications of design of experiments. Principles of experimentation, Analysis of Completely randomized Design (C.R.D), Randomized Block Design (R.B.D)

Module - II: Design of Experiments **10 Periods**

Latin Square Design (L.S.D) including one missing observation, expectation of various sum of squares. Introduction to Factorial design - 2^2 and 2^n Factorial design. Analysis of Co-variance (ANCOVA) (Only one way). Conducting ANCOVA – Two way Comparison of the efficiencies of above designs.

Module - III: Statistical Quality Control **10 Periods**

A:Importance of SQC in industry. Statistical basis of Shewart control charts. Construction of control charts for variables (mean,range and standard deviation) and attributes (p,np,c&d charts with fixed and varying sample sizes).

B:Interpretation of control charts. Natural tolerance limits and specification limits process capability index. Concept of Six sigma and its importance, Single and double sampling plans.

Module - IV: Multiple Regression &Time Series **9 Periods**

Multiple Regression for n- independent variables

Time Series : Fitting a trend line to a time series, Method of least Squares and Method of Moving Averages, Measure of Seasonal Variation.

Module - V: Queuing Theory **9 Periods**

Structure of a queuing system, Operating Characteristics of queuing system, Transient and Steady states, Terminology of Queuing systems, Arrival and service processes, Pure Birth-Death process Deterministic queuing models, (M/M/1):(∞:FIFO) Model, (M/M/1):(N:FIFO) Model .

Text Books

1. Monte Gomery, **"Applied Statistics and Probability for Engineers"**, 6th Edition, Wiley Publications.

2. J K Sharma, **"Operations research Theory and applications"** Macmillan publishers india limited,4th edition.
3. Paul A Maeyer, **"Introductory Probability and Statistical Applications"**, John Wiley Publicaitons.

References

1. Willam Feller : **"Introduction to Probability theory and its applications"**.Volume –I ,Wiley 2.
2. Goon AM, Gupta MK, Das Gupta B : **"Fundamentals of Statistics"**, Vol-I, the World Press Pvt.Ltd. , Kolakota.
3. V.K.Kapoor and S.C.Gupta: **"Fundamentals of Mathematical Statistics"**, Sultan Chand &Sons, New Delhi

E-Resources

1. https://onlinecourses.science.psu.edu/stat502/node/183 (ANCOVA)
2. http://www.uoguelph.ca/~dsparlin/sqc.htm (Statistical Quality control)
3. http://irh.inf.unideb.hu/~jsztrik/education/16/SOR_Main_Angol.pdf (Basic Queueing Theory)
4. http://www.ijpcsonline.com/files/34-781.pdf (Design of Experiments)
5. http://nptel.ac.in/courses/110106064/5 (Introduction to Data Analysis)
6. http://nptel.ac.in/courses/111104075/ (ANOVA and Design of Experiments)

Course Outcomes:

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

1. Perform Analysis of variance, ANCOVA and design of experiments in manufacturing firms.
2. Advanced design of experiments and their applications.
3. learn the concept of quality control , Six Sigma and its importance to real life problems.
4. understand the concept of Multiple regression and Application of Time-series,
5. Find the expected queue length, the ideal time, the traffic intensity and the waiting time. These are very useful tools in many engineering and data management problems in the industry. It is useful for all branches of engineering.

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	1				3			1			
CO2	3	2	2	3	3							1			
CO3	3	2	2	3	2				2			2			
CO4	3	2	2	2	1				3			2			
CO5	3	2	2	3	2				3			2			

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80B13	OPTIMIZATION TECHNIQUES	L	T	P
Credits: 3	(Open Elective)	3	-	-

Prerequisites: Basic concepts of Linear Programming

Course Objectives: This course deals with the extremely important topics under the broad umbrella of optimization. This is synonymous with efficiency which is the underlying prime rationale for all scientific and technological advances and progress.

MODULE - I: Introduction and Basic Concepts of Optimization 10 Periods

Historical Development; Engineering applications of Optimization; Art of Modeling - Objective function; Constraints and Constraint surface; Formulation of design problems as mathematical programming problems.

MODULE - II: Optimization using Calculus 9 Periods

Classification of optimization problems Optimization techniques – classical and advanced techniques. Stationary points; Functions of single and two variables; Global Optimum - Convexity and concavity of functions of one and two variables - Optimization of function of one variable and multiple variables; Gradient vectors;

MODULE - III: Linear Programming Applications 10 Periods

A: Optimization of function of multiple variables subject to equality constraints; Lagrangian function Optimization of function of multiple variables subject to equality constraints.

B: Hessian matrix formulation; Eigen values Kuhn-Tucker Conditions; Post optimality analysis - Other algorithms for solving LP problems – Karmarkar's projective scaling method

MODULE – IV: Dynamic Programming 10 Periods

Sequential optimization; Representation of multistage decision process; Types of multistage decision problems; Concept of sub optimization and the principle of optimality - Recursive equations – Forward and backward recursions; Computational procedure in dynamic programming (DP)

MODULE – V: Applications of Dynamic Programming 9 Periods

Problem formulation and application in Design of continuous beam and Optimal geometric layout of a truss - Water allocation as a sequential process - Capacity expansion and Reservoir operation

Text Books

1. S.S. Rao,"Engineering Optimization: Theory and Practice", New Age International (P) Ltd., New Delhi, 2000.
2. G. Hadley,"Linear programming", Narosa Publishing House, New Delhi, 1990.

References

1. H.A. Taha,"Operations Research:An Introduction", 5th Edition, Macmillan, New York, 1992.
2. K. Deb,"Optimization for Engineering DesignAlgorithms and Examples",Prentice-Hall of India Pvt. Ltd., New Delhi, 1995.

3. K.Srinivasa Raju and D. Nagesh Kumar, "Multicriterion Analysis in Engineering and Management",PHI Learning Pvt. Ltd., New Delhi, India, ISBN 978-81-203-3976-7, pp.288,

E-Resources

1. http://www.mhhe.com/engcs/industrial/hillier/etext/PDF/chap03.pdf (LPP)
2. http://ocw.nctu.edu.tw/upload/classbfs121001503719748.pdf
3. http://shodhganga.inflibnet.ac.in/bitstream/10603/19544/12/7_chapter%201.pdf
4. http://www.ime.unicamp.br/~andreani/MS515/capitulo12.pdf

Course Outcomes

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

1. Understand the historical development of OR and formulate the design problems.
2. Find the optimum values using calculus
3. Apply the linear programming techniques to solve the engineering problems
4. Know the various concepts of Dynamic Programming.
5. Apply the Dynamic Programming techniques to solve the engineering problems

CO- PO, PSO 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**	**PO 10**	**PO 11**	**PO 12**
CO1	**3**	**2**	**3**	**3**	**3**		**2**		**2**	**2**		**1**
CO2	**3**	**2**	**2**	**2**	**2**		**2**	**3**	**1**	**2**	**2**	**1**
CO3	**3**	**2**	**2**	**3**	**2**		**2**		**2**	**2**	**2**	**2**
CO4	**3**	**2**	**2**	**2**	**2**		**2**	**3**	**3**	**3**	**2**	**2**
CO5	**3**	**2**	**2**	**2**	**2**		**1**			**2**		**2**

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code:80B14	ADVANCED PHYSICS FOR ENGINEERS (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Engineering Physics & Applied Physics

Course Objectives:

The objective of this course is to make the students familiar with the recent advanced concepts in physics

Module I: Special Theory of Relativity **9 Periods**

Introduction, Concept of theory of relativity, Frames of reference-Inertial, non-inertial; Galilean transformation equations, Michelson-Morley experiment, Einstein theory of relativity, Lorentz transformation of space and time, Length contraction, Time dilation, Variation of mass with velocity, Relativistic relation between energy and momentum.

Module II: Holography **9 Periods**

Introduction, Basic principle, Construction and Reconstruction of Hologram, Properties of Hologram, Types of Holograms, Applications- Holographic Interferometry, Acoustic Holography, Holographic Microscopy.

Module III: Thin films Synthesis and Characterization **12 Periods**

A: Introduction, Deposition techniques-Pulsed Laser Deposition (PLD), Spray Pyrolysis; Nucleation and growth of the thin films, properties (Mechanical, Electrical, Magnetic and Optical).

B:Characterization

X-Ray Photoelectron Spectroscopy (XPS), Energy Dispersive X-Ray Analysis (EDAX), Principles and applications of X-Ray Diffraction, Electron Diffraction, Atomic Force Microscopy.

Module IV: Photonic Crystals **9 Periods**

Important features of photonic crystals, Presence of photonic band gap, anomalous group velocity dispersion, Micro cavity, effects in Photonic Crystals, fabrication of photonic Crystals, Dielectric mirrors and interference filters, PBC based LEDs, Photonic crystal fibers (PCFs), Photonic crystal sensing.

Module V: Solar cell Physics **9 Periods**

Single, poly and amorphous silicon, GaAs, CdS, Cu2S, CdTe; Origin of photovoltaic effect, Homo and hetero junction, working principle of solar cell, Evaluation of Solar cell parameters, I-V, C-V and C-f characteristics.

TextBooks

1. R K Gaur and SL Gupta, "**Engineering Physics" Dhanpat Rai Publications,** 8th **revised** Edition, 2006.

2. B K Pandey and S Chaturvedi, "**Engineering Physics"** Cengage Learning India, Revised Edition, 2014.

References

1. R F Bun shah, "**Hand Book of Technologies for Films and coating",** Noyes publishers, 1st Edition, 1996.
2. B E A Saleh and A C Tech*, "**Fundamentals of Photonics", John Wiley and Sons,*** New York, 1st Edition, 1993.
3. K L Chopra and S R Das, "**Thin film Solar Cells", Plenum press, 1st Edition 1983.**
4. K Vijaya Kumar, T Sreekanth and S Chandralingam, "**Engineering Physics" S Chand** and Co 1st Edition, 2008.

E-Resources

1. http://physics.mq.edu.au/~jcresser/Phys378/LectureNotes/SpecialRelativityNotes.pdf
2. http://www.kfupm.edu.sa/centers/CENT/AnalyticsReports/KFUPM-TFSC-Dec20.pdf
3. https://www.journals.elsevier.com/solar-energy-materials-and-solar-cells
4. https://www.journals.elsevier.com/journal-of-alloys-and-compounds/
5. http://aip.scitation.org/journal/apl
6. http://nptel.ac.in/courses/115101011/
7. http://nptel.ac.in/courses/117103066/11

Course Outcomes

At the end of the course, students will be able to:
1. be aware of the concepts of special theory of relativity.
2. analyze the basic concepts of Holography and applications.
3. acquire the knowledge on synthesis methods of thin films and their characterization techniques.
4. develop basic knowledge on the photonic crystals
5. apply the basic concepts of solar cell physics.

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**	**1**												
CO2	**3**	**2**	**1**												
CO3	**3**	**1**	**1**		**1**	**1**									
CO4	**2**	**1**	**1**												
CO5	**3**	**2**	**1**		**3**	**2**	**2**								

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80B15	NANO MATERIALS (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Engineering Physics

Course Objectives:

The objective is to provide different methods of synthesis and characterization of nano materials.

Module I: Physical Methods **9 Periods**

Bottom-up approachand Top-down approach, Inert gas condensation, Arc Discharge, lasers ablation, laser pyrolysis, ball milling, molecular beam epitaxial, and electro deposition.

Module II: Chemical methods **8 Periods**

Nanocrystals by chemical reduction, photochemical synthesis, electrochemical synthesis, Nano crystals of semiconductors.

Module III: Thermal Methods & Surface Characterization

A: Thermal Methods: **7 Periods**

Thermolysis route – spray pyrolysis and solved metal atom dispersion, sol-gel method solvothermal and hydrothermal routes, solution combustion synthesis, CVD method.

B: Surface Characterization **7 Periods**

Scanning electron microscopy (SEM), Transmission electron microscopy (TEM). Photo luminescence Spectroscopy.

Module IV: Compositional and structural Characterization techniques **9 Periods**

X-Ray Photoelectron Spectroscopy (XPS), Energy Dispersive X-Ray Analysis(EDAX), Principles and applications of X-Ray Diffraction, Electron Diffraction, and Electron probe microanalysis(EPMA).

Module V: Properties and Applications of Nanomaterials **8 Periods**

Carbon Nano Tube (CNT) – Single-Wall Carbon Nano Tube (SWCNT), Multi-wall carbon Nano tube (MWCNT), Activated carbon, Fullerene, Graphene, Quantum wire and Quantum dots

Text Books

1. C N R Rao, A Muller and A K Cheetham **"The chemistry of Nanomaterials: Synthesis, Properties and Appliocations"** John Wiley, First Edition, 2004

2. Hari Singh Nalwa, **"Nanostructured Materials and Nanotechnology",** Academic Press, First Edition, 2002.

References

1. Charles P Poole Jr "**Introduction to Nanotechnology",** John Willey & Sons, 1st Edition, 2003

2**.** C Dupas, P Houdy, M Lahmani, Nanoscience**: "Nanotechnologies andNanophysics",** Springer-Verlag Berlin Heidelberg, 1st Edition, 2007

3. T Pradeep, "**NANO: The Essentials: Understanding Nanoscience and Nanotechnology".** Tata McGraw-HillPublishing Company Limited, Revised Edition, 2007

4. Z L Wang, "**Characterization of Nanophase Materials"** Wiley-VCH, 1st Edition**,** 2000.

5. K Vijaya Kumar, T Sreekanth and S Chandralingam, "**Engineering Physics" S** Chand and Co 1st Edition, 2008.

E-Resources

1. http://nptel.ac.in/courses/103103033/module9/lecture1.pdf
2. http://courses.washington.edu/overney/NME498_Material/NME498_Periods/Lecture4
   - Overney-NP-Synthesis.pdf
3. http://www.materialstoday.com/nanomaterials/journals/
4. https://www.journals.elsevier.com/nanoimpact
5. http://www.springer.com/materials/nanotechnology/journal/12274
6. http://nptel.ac.in/courses/118104008/
7. http://nptel.ac.in/courses/118102003/

Course Outcomes

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

1. be aware of different physical methods of synthesis of nano materials.
2. be aware of different chemical methods of synthesis of nano materials.
3. Understand different thermal methods of synthesis of nano materials and to learn different surface characterization techniques.
4. acquire the the different compositional and structural characterization techniques.
5. develop basic knowledge on the properties and applications of few nano

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**													
CO2	**2**	**1**													
CO3	**2**	**1**													
CO4	**3**	**2**	**2**		**2**										
CO5	**3**	**2**	**2**		**2**										

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80B16	NDT AND VACUUM TECHNOLOGY (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisites: Engineering Physics

Course Objectives:

The objective is to provide a basic level of understanding on Non-destructive testing and Vacuum technology.

Module I: Introduction to Non destructive testing **6 Periods**

Introduction, Objectives of Non destructive testing, Types of defects – Cracking, Spalling, Staining, Construction and Design defects, Honey combing, Dusting, Blistering, Rain damage.

Module II: Methods of Non destructive Testing **9 Periods**

Liquid penetration method, Dye penetration method, Radiographic testing, Ultrasonic Inspection method, Pulse Echo method, Magnetic particle testing, Eddy current Testing.

Module III: Introduction to Vacuum Technology and Flow meters

A: Introduction to Vacuum Technology **9 Periods**

Definition of vacuum, Degrees of vacuum and their ranges; Review of Kinetic theory of gases; Definitions of particle flux, mono layer formation time, pressure; Elementary gas transport phenomena; Knudsen's and Reynolds' numbers; Throughput, mass flow and conductance;

B: Flow meters **7 Periods**

Molar flow, Mass flow and throughput; Rota meters and chokes; differential pressure techniques;

Module IV: Pressure gauges **8 Periods**

Classification, Direct and indirect gauges, Indirect gauges – Pirani gauge, Thermocouple gauge, Ionization gauge, hot cathode gauge, Penning gauge

Module V: Vacuum Pumps **9 Periods**

Introduction, Pumping speed, Rotary vane pump, Turbo molecular pump, Diffusion pumps

Text Books

1. B K Pandey, S Chaturvedi, **"Engineering Physics", Cengage learning,** 1st Edition, 2014

2. John. F. O'Hanlon**, "A User's guide to Vacuum technology",** Wiley, 3rd Edition**,** 2003

References

1. M R Srinivasan, **"Physics for Engineers",** New Age international, 1st reprint, 2007

2. R K Gaur and S L Gupta, "**Engineering Physics",** Dhanpat rai, Reprint, 2006

3. Krishna Seshan, "**Hand Book of Thin film deposition", Noyes,** 2nd Edition, 2002

E-Resources

1. http://www.enfm.net/catalog/catalog/enfm-usa.pdf
2. http://web.itu.edu.tr/~arana/ndt.pdf
3. http://www.issp.ac.ru/ebooks/books/open/Nondestructive_Testing_Methods_and_New_Applications.pdf
4. https://www.journals.elsevier.com/ndt-and-e-international/
5. https://www.journals.elsevier.com/vacuum
6. http://nptel.ac.in/courses/114106035/35
7. http://nptel.ac.in/courses/112101004/37

Course Outcomes

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

1. aware of the concepts of NDT
2. Understand different methods of NDT.
3. Anaylize Vacuum technology and concepts of flow meters.
4. Develop pressure gauges.
5. Understand the concepts of different vacuum pumps

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**													
CO2	**3**	**2**													
CO3	**3**	**2**			**2**										
CO4	**2**	**2**			**2**										
CO5	**2**	**2**			**2**										

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80B17	CHEMISTRY OF ENGINEERING MATERIALS (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisite: Nil

Course Objectives:

The objective is to make the students know about the concept of phase rule and alloys, phase diagrams of different systems. To give knowledge to the students regarding liquid crystals, abrasives, glass, ceramics, refractories, colloids and adhesives. To make the students for understand the basic concepts of chemistry to develop futuristic materials for high-tech. applications in the area of engineering.

Module-I: Phase Rule and alloys **10 Periods**

Phase Rule: Definition of terms: Phase, component, degree of freedom, phase rule equation. Phase diagrams-one component system-water system. Two component system Lead-Silver, cooling curves, heat treatment based on iron-carbon phase diagram - hardening, annealing and normalization. Introduction to alloys-fabrication of alloys-ferrous alloys-nonferrous alloys-industrial applications.

Module-II: Composites, Abrasives and Adhesives **10 Periods**

Composites: Basics of composites, composition and characteristics-types of composites – particle and fiber reinforced composites and their applications. Abrasives- natural and artificial abrasives-grinding wheels-abrasive paper and cloth. Adhesives- classification - action of adhesives- factors influencing adhesive action development of adhesive strength.

Module-III: Cement and Concrete **10 Periods**

A: Introduction-Classification of cement-natural-chemical composition of cement-port land cement-chemical reactions involved in setting and hardening of cement-additives for cement-mortars.

B: Concretes-pre stressed concrete-post tensioning-curing-overall scenario of cement industry-Reinforced concrete, constructions-testing and decaying of cement-prevention of cement decay.

Module-IV: Glass, Ceramics and Refractories **9 Periods**

Structure of glass-properties-Manufacturing of glass-Types of glasses-uses Ceramics-clays-methods for fabrication of ceramic ware plasticity of clays. Ceramic products-glazes. Porcelain and vitreous enamels. Requisites of a good refractory-classification, properties and applications of refractories.

Module-V: Colloids and surfactants **9 Periods**

Introduction to solution-types of colloids-characteristics of lyophilic and lyophobic solutions-preparation of colloids (Dispersion methods & Aggregation methods)-

purification of colloids (Dialysis, Electrodialysis and Ultrafiltration). Characteristics of colloidal solutions-coagulation of colloids-origin of charge on colloids-protective colloids-emulsions-gels-applications of colloids. Introduction to surfactants-classification of surfactants-CMC (critical micelle concentration)-HLB scale-detergents-cleaning action.

Text Books

1. P.C.Jain and Monica Jain, "**A text Book of Engineering Chemistry"**, DhanpatRai Publications, New Delhi, 12th Edition 2006.
2. B.Rama Devi, Ch.VenkataRamana Reddy and PrasanthaRath, **"Text Book of Engineering chemistry"** , Cengage Learning India Pvt.Ltd,2016.
3. J. Goodwin, **"Colloids and Interfaces with Surfactants and Polymers"** 2nd Edition 2009.

References:

1. B.R.Puri, L.R.Sharma and M.S.Pathania,"**Principles of Physical Chemistry",** S.Nagin Chand &Co., New Delhi, 23rd Edition, 1993.\
2. M.Thirumala Chary and E.Laxminarayana, **"Engineering Chemistry"**, SciTech publications (INDIA) PVT Ltd, Third Edition, 2016.

E-Resources

1. www.istl.org/02-spring/internet.html (Basics on materials)
2. http://www.zzm.umcs.lublin.pl/Wyklad/FGFAng/7A.F.G.F.%20Colloids.Emuls.pdf (colloids)
3. Journal of materials science (Springer publishers)
4. Journal of materials science and technology (Elsevier publishers)
5. nptel.ac.in/courses/105102012/ (Cement concrete technology)
6. http://www.nptel.ac.in/courses/112104039/53 (liquid crystals)

Course Outcomes

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

1. Interpret the vitality of phase rule in metallurgy and application of phase rule to one and two component systems.
2. Understand the concepts ofabrasives, adhesives andliquid.
3. The immense importance of basic constructional material, Portland cement in Civil Engineering works.
4. To acquire the knowledge about properties and applications of glass, ceramics and refractories.
5. Understand the relationships between macroscopic material properties and microscopic structures.

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**		**1**		**1**										
CO2	**2**	**1**	**1**	**1**											
CO3	**1**	**3**		**1**	**1**										
CO4	**1**	**1**	**1**	**2**											
CO5	**1**	**1**		**1**	**1**	**2**	**1**								

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code: 80B18	NANO CHEMISTRY (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisite: Nil

Course Objectives:

The objective is to make the learners know about the scope of nanoscale materials and their versatile properties. To give knowledge of various instrumental techniques to the analysis the nanomaterials. To make aware of the learners of different applications of nanomaterials.

Module-I : Nanochemistry-I **9 Periods**

Introduction -synthesis of nanostructure materials, Bottom-up approach and Top-down approach with examples-sol-gel method-solvothermal and hydrothermal routes, Chemical Vapor Deposition and precipitation methods.

Module-II: Nanochemistry-II **10 Periods**

Properties of nanomaterials-Electronic properties, Energy bands and gaps in semiconductors, Fermi surfaces-Optical properties- Fluorescence/luminescence, Photoluminescence/fluorescence, Electroluminescence, quantum dot. Magnetic properties-mechanical properties-thermal properties.

Module-III: Instrumental Analysis **10 Periods**

A: Characterization techniques: Scanning Electron Microscopy(SEM), Electron Dispersion Spectroscopy (EDS),

B: Transmission Electron Microscopy (TEM), Dynamic Light Scattering (DLS) and Atomic Force Microscopy(AFM) -Illustrative examples.

Module-IV: Carbon Nanotubes and Application **10 Periods**

Carbon Nanostructures, types and preparation of Carbon Nanotubes. Nanostructured crystals. Graphene, Carbon nanofibers- Carbon clusters and Fullerenes- optical and telecommunication applications. Organic NanoSolar cells and its applications.

Module-V: Environmental Nanotechnology **9 Periods**

Implications of Nanotechnology & Research needs-Nanostructured Catalysts TiO_2 Nanoparticles for Water purification- Nano membranes in drinking water treatment and desalination, Nanomembranes in Sea desalination-Nano particles for treatment of Chlorinated Organic Contaminants.

Text Books

1. Mark A. Ratner, D. Ratner. **"Nanotechnology a gentle introduction to the next big idea"**,Pearson Education Inc., Asia, 2003.

2. Pradeep.T. "Nano: The essentials-understanding nanoscience and nanotechnology". Tata Mc.Graw Hill, New Delhi, 2007.

References

1. A. K. Haghi, Ajesh K. Zachariah, NandakumarKalariakkal. **"Nanomaterials: Synthesis, Characterization, and Applications"**. Apple Academic Press, 2013.
2. Brechignac C., Houdy P., Lahmani M. (Eds.) **"Nanomaterials and Nanochemistry"** (Springer,) 748p. ISBN 978-3-540-72993-8, 2007
3. Phanikumar. **"Principles of nanotechnology",**Scitech Publications 2nd Edition, 2010.
4. Preetijain, Shankar lalGarg. **"Environmental Nanotechnology"** Lap lambert Academic publishing, 2015.

E- Resources

1. www.docbrown.info/page03/nanochem02.htm (Nanochemistry applications)
2. https://books.google.co.in/books?isbn=352732626X (concepts of nanochemistry)
3. Journal of nanostructure in chemistry (springer publishers)
4. Nanochemistry (wiley publishers)
5. nptel.ac.in/courses/118104008/6 (Introduction to nanomaterials)
6. nptel.ac.in/courses/118104008/ (Nanostructures and nanomaterials)

Course Outcomes

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

1. Students will learn the different synthetic methods of the nanomaterials.
2. To know the student Electronic, optical and magnetic properties of nanomaterials.
3. To acquire the knowledge various instrumental methods of analysis (TEM, EDS, SEM, DLS &AFM).
4. The students can come to know the carbon nanotubes, carbon nanofibers, nanostructured catalysts and organic nanosolar cells.
5. Students will learn usage of nanomaterials in the purification of water.

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**										
CO2	**1**		**2**	**1**											
CO3	**1**	**2**		**2**	**1**										
CO4	**2**		**2**	**1**											
CO5	**1**	**2**			**1**	**2**	**1**								

2018-19 Onwards (MR-18)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech.		
Code:80B19	POLYMER CHEMISTRY (Open Elective)	L	T	P
Credits: 3		3	-	-

Prerequisite: Nil

Course Objectives:

The subject provides an introduction to polymer science along with the synthesis of macromolecules by step-growth and chain-growth polymerization. Compounding of polymers and different fabrications methods are discussed. Molecular weight determination of polymers is shown using gel permeation chromatography. An overview of biodegradable and conducting polymers is also given.

Module I: Introduction to Polymer Chemistry 10 Periods

Definitions-Origin, Monomers and its requirements - Broad classification of polymers- types based on structure (homo & copolymers), processing (thermo plastics & thermosetting plastics) and applications. Molecular force and chemical bonding in polymers - tacticity. Determination of molecular weight (MW)-methods for number average- weight average- PDI(poly dispersity index)-effect of polymerization on PDI. Distribution and processing of polymers using Tg& Tm.

Module II: Polymerization mechanism 10 Periods

Chain growth Polymerization – Addition Polymerization – Reaction Mechanism - Free Radical Reaction – Ionic Reaction – Coordination Polymerization – Ring – Opening Polymerization –Condensation (step) Polymerization – Degree of Polymerization– differences between addition and step growth polymerization. Polymerization techniques -bulk, solution, suspension, emulsion-advantages and disadvantages.

Module III: Compounding of Polymers & fabrication methods 9 Periods

A: Introduction-compounding of polymers and their functions, selection of additives (by function), improving/modifying the mechanical properties.

B:Fabrication of plastics by compression, injection, transfer, extrusion –moulding, blowing and thermoforming methods.

Module IV: Characterization techniques 10 Periods

Molecular mass by Gel permeation chromatography, Molecular structure by X-ray diffraction, Morphology of polymer using -Scanning Electron Microscopy, Thermal stability using Thermogravimetric analysis (TGA).

Module V: Biodegradable polymers and conducting polymers 9 Periods

Biodegradable polymers, types, examples: Polyhydroxy butyrate (PHB), Poly-Hydroxybutyrate-co-β-Hydroxyvalerate (PHBV), Polyglycolic acid (PGA), Polylactic acid (PLA), Poly (ε-caprolactone) (PCL). Applications of biodegradable polymers. Conducting polymers (poly aniline and poly acetylene)-types-properties-doping-applications.

Text Books

1. P.C.Jain and Monica Jain, "**A text Book of Engineering Chemistry"**, DhanpatRai Publications, New Delhi, 12th Edition 2006.
2. S.S. Dara and S.S. Umare, "**A Text Book of Engineering Chemistry"**, S Chand Publications, New Delhi, 12th Edition 2010.
3. P. C. Hiemenz and T. P. Lodge. **"Polymer Chemistry**", 2nd edition, CRC Press, 2007.
4. F.W. Billmeyer, "**Text Book of Polymer Science"**, John Wiley & Sons, 4th Edition, 1996.
5. V.R. Gowariker, **"Polymer Science"**, New Age International Publisher, 2nd Edition, 2015.

References

1. B.Rama Devi, Ch.Venkata Ramana Reddy and Prasantha Rath, **"Text Book of Engineering chemistry"**, Cengage Learning India Pvt.Ltd,2016.
2. Prasanth Rath, **"Engineering Chemistry"**, Cengage Learning India Pvt.Ltd, 2015.

E- Resources

1. http://hysz.nju.edu.cn/wangxl/download-polymer/Polymer%20Chemistry%20(Carraher).pdf (polymer chemistry)
2. file:///C:/Users/Admin/Downloads/polymer-science-and-technology.pdf(polymer science and technology)
3. European polymer journal (Elsevier publishers)
4. Journal of polymer research (Springer publishers)
5. http://nptel.ac.in/courses/104105039/ (Polymer chemistry)
6. http://nptel.ac.in/courses/113105028/ (Polymers)

Course Outcomes

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

1. Analyse different mechanisms of polymer formation and use this information in thesynthesis of different polymers.
2. Evaluate the effect of factors such as polymer structure, molecular weight, branching and diluents on crystallinity.
3. Interpret experimental data and determine the structure of polymers by different techniques.
4. Assess the compounding of polymers & fabrication methods.
5. To know the student importance of biodegradable and conduction polymers.

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	1										
CO2	2		1		2										
CO3		2	1	2	1										
CO4	2	1	2												
CO5	2	1		1	2		1								