

# ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABUS

Effective from the Academic Year 2017-18 onwards



National Assessment & Accreditation Council

## Department of Mechanical Engineering (ME)



For  
**B. Tech. Four Year Degree Programme**  
(MR17 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)  
and NBA, Maisammaguda, Dhulapally (Post Via Kompally), Secunderabad-500 100  
Website: [www.mrec.ac.in](http://www.mrec.ac.in) E-mail: [principal@mrec.ac.in](mailto:principal@mrec.ac.in)

**MALLA REDDY ENGINEERING COLLEGE**  
**(AUTONOMOUS)**  
**MR17 – ACADEMIC REGULATIONS (CBCS)**  
**for B.Tech. (REGULAR) DEGREE PROGRAMME**

Applicable for the students of B.Tech. (Regular) programme admitted from the Academic Year **2017-18** 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 provide world class platform for Education, Research, Knowledge and Technical skill in Mechanical Engineering and to create leaders with passion for innovation to ensure environment friendly development needs of the society.

**DEPARTMENT MISSION**

Create innovative learning atmosphere with superior and environment friendly infrastructure for better understanding of the technical knowledge in practical situations, so as to make them effective ethical and global leaders.

**PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

**PEO1:** To develop the ability among students to synthesize data and technical concepts for applications related to product design and development in industry that meet the global needs.

**PEO2:** To provide students with sound foundation in the mathematical, scientific and engineering fundamentals necessary to formulate, solve and analyse engineering problems and to prepare them to work as part of teams on multi disciplinary projects.

**PEO3:** To promote student awareness of the lifelong learning and to create them with professional ethics and code of practice.

### PROGRAMME OUTCOMES (POs)

PO 1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	<b>Problem analysis:</b> 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	<b>Design/development of solutions:</b> 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	<b>Conduct investigations of complex problems:</b> 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	<b>Modern tool usage:</b> 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	<b>The engineer and society:</b> 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	<b>Environment and sustainability:</b> 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	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	<b>Individual and team work:</b> Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	<b>Communication:</b> 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	<b>Project management and finance:</b> 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	<b>Life-long learning:</b> 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:** Understand the problem and apply design and analysis tools to find solution in the domains of Structural, thermal and Fluid Mechanics.

**PSO2:** Engage professionally in industries or as an entrepreneur by applying Manufacturing concepts.

**PSO3:** Systemize the Engineering and manufacturing practices using TQM concepts and Optimization techniques.

1. **Under-Graduate Degree Programme in Engineering & Technology (UGP in E&T): Malla Reddy Engineering College (Autonomous)** offers 4 Year (8 Semesters) **Bachelor of Technology (B.Tech.)** Under Graduate Programmes, with effect from the Academic Year 2017-18 onwards, 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 24 credits, totaling to 192 credits for the entire B.Tech. programme.

Each student shall secure 192 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 UGP is of 4 academic years (8 Semesters), with the academic year being divided into two semesters of 22 weeks ( $\geq 90$  teaching days, out of which number of contact days for teaching / practical  $\geq 75$  and conducting examinations and preparation days = 15 ) each, each semester having ‘**Continuous Internal Evaluation (CIE)**’ and ‘**Semester End Examination (SEE)**’. 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; and
- One Credit - for two hours / Week / Semester for Laboratory / Practical (P) Courses or Tutorials (T).

Courses like Computational Mathematics Lab, Environmental Science, Professional Ethics, Gender Sensitization lab, Law for Engineers, Fine Arts / Foreign languages 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)**

(f) **Minor Courses (MiC)**

- **Foundation Courses (FC)** are further categorized as:
  - (i) Humanities and Social Sciences (HS)
  - (ii) Basic Sciences (BS)
  - (iii) Engineering Sciences (ES).
- **Core Courses (CC) and Elective Courses (EC)** are categorized as Professional Subjects (PS), which are further subdivided as –
  - (i) Professional / Departmental Core (PC) Subjects
  - (ii) Professional / Departmental Electives (PE)
  - (iii) Open Electives (OE)
  - (iv) Project Related (PR)
- **Mandatory Courses (MC - Non-credit with evaluation).**
- **Audit Courses (AC – Non - credit without evaluation).**
- **Minor Courses (MiC – One or two credit courses)**

### 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. No.	Classification		Course Work – Subject Area	Distribution of credits	As per AICTE
	AICTE	UGC			
1	HS	Foundation Courses	Humanities and Social sciences including English, Environmental Sciences and Management subjects.	5.2 %	5 - 10 %
2	BS		Basic Sciences (BS) including Mathematics, Physics and Chemistry.	15.10 %	15 - 20 %
3	ES		Engineering Sciences (ES) including Engineering Workshop, Engineering Graphics, Basics of Electrical and Electronics / Mechanical / Computer Engineering.	18.75 %	15 - 20 %

4	PC	Core Courses	Professional core subjects are relevant to the chosen specialization / branch; [May be split into Hard (no choice) and Soft (with choice)], if required.	35.41 %	30 - 40 %
5	PR	Project Related	Minor and major projects, Technical Seminar and Comprehensive viva-voce.	9.89 %	10 - 15 %
6	PE	Professional Electives	Professional electives are relevant to the chosen specialization / branch.	10.41 %	10 - 15 %
7	OE	Open Electives	Open electives are the courses from other technical and / or emerging subject areas.	5.2 %	5 - 10 %
8	MC	Mandatory Courses	These courses are non - credit courses with evaluation.	-	-
9	AC	Audit Courses	These courses are non - credit courses without evaluation.	-	-
10	MiC	Minor Courses	These are one or two credit courses intended to improve the skills of the student in placements and entrepreneurship.	-	-
<b>Total credits for UGP (B.Tech.)</b>					<b>192</b> <b>(100%)</b>

#### 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  $\pm 4$  credits of the semester with minimum credits of 20 and maximum credits of 28, 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 only one open elective in a semester 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, Computational Mathematics Lab, 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 70.
- 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' (ie., 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 % (  $\geq 65\%$  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.7.

**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 40 % marks (24 out of 60 marks) in the Semester End Examination and a minimum of 40 % of the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) marks taken together (i.e. 40 marks); in terms of Letter Grades, this implies securing 'P' Grade or above in that Subject / Course.

**7.2** A student shall be deemed to have satisfied the Academic Requirements and earned the credits allotted to Minor Project / Technical Seminar / Major 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 Minor Project / Technical Seminar / Major 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 / Main 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:

<b>Sl. No.</b>	<b>Promotion</b>	<b>Conditions to be fulfilled</b>
1.	First year first semester (I Semester) to first year second semester (II Semester)	<ul style="list-style-type: none"><li>• Regular course of study of first year first semester. (I Semester)</li></ul>
2.	First year second semester (II Semester) to second year first semester (III Semester)	<ul style="list-style-type: none"><li>• Regular course of study of first year second semester (II Semester).</li><li>• 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.</li></ul>
3.	Second year first semester (III Semester) to second year second semester (IV Semester)	<ul style="list-style-type: none"><li>• Regular course of study of second year first semester (III Semester)</li></ul>



4.	Second year second semester (IV Semester) to third year first semester (V Semester)	<ul style="list-style-type: none"> <li>• Regular course of study of second year second semester (IV Semester).</li> <li>• 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.</li> </ul>
5.	Third year first semester (V Semester) to third year second semester (VI Semester)	<ul style="list-style-type: none"> <li>• Regular course of study of third year first semester (V Semester).</li> </ul>
6.	Third year second semester (VI Semester) to fourth year first semester (VII Semester)	<ul style="list-style-type: none"> <li>• Regular course of study of third year second semester (VI Semester).</li> <li>• 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.</li> </ul>
7.	Fourth year first semester (VII Semester) to fourth year second semester (VIII Semester)	<ul style="list-style-type: none"> <li>• Regular course of study of fourth year first semester (VII Semester).</li> </ul>

- 7.4** A Student shall register for all subjects covering 192 credits as specified and listed (with the relevant Course / Subject Classifications as mentioned) in the Course Structure, fulfills all the Attendance and Academic requirements for 192 credits securing a minimum of 'P' Grade (Pass Grade) or above in each subject and earn all 192 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 192 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 subjects for optional drop out from these 192 credits earned; resulting in 186 credits for under graduate programme performance evaluation, i.e., the performance of the student in these 186 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 192 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 192 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.7 and 8.1 to 8.5.
- 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 (there by 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**

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.,. For all Subjects / Courses, the distribution shall be 40 marks for CIE (Continuous Internal Evaluation) and 60 marks for the SEE (Semester End Examination) and a Letter Grade corresponding to the % of marks obtained shall be given.

### **8.1 Theory Courses:**

#### **8.1.1 Continuous Internal Evaluation (CIE):**

During the semester, there shall be **2 mid - term examinations** for 40 marks each. Each mid - term examination consists of online **objective test** for 10 marks with duration of **20 minutes** and **subjective paper** for 25 marks with duration of **90 minutes**. Further, there will be an allocation of 5 marks for **Assignment**.

<b>Mid – Term Examination -UG</b>				
<b>Part</b>	<b>Type of Questions</b>	<b>No. of questions</b>	<b>Marks per question</b>	<b>Total</b>
Part A	Multiple-choice questions	20	0.5	10
Part B	Compulsory questions	5	2	10
Part C	Choice questions [3 out of 5]	3	5	15
<b>Mid-Term Exam Total</b>				35
Assignment				05
<b>Grand Total</b>				40

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 mid – term examinations. The assignments shall be as specified by the concerned subject teacher. The first mid - term examination marks, first assignment marks shall make one set of CIE marks and the second mid - term examination marks, second assignment marks shall make second set of CIE marks; and 70% of the best performed plus 30% of the other shall be taken as the final marks secured by the student towards Continuous Internal Evaluation in that theory subjects.

### 8.1.2 Semester End Examination (SEE):

The distribution of marks is as given below:

<b>Semester End Examination</b>				
<b>Part</b>	<b>Type of Questions</b>	<b>No. of questions to be answered</b>	<b>Marks per question</b>	<b>Total</b>
Part A	Compulsory Questions (One from each Module)	5	2	10
Part B	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	10	50
<b>Grand Total</b>				<b>60</b>

### 8.2 Practical Courses:

#### 8.2.1 Continuous Internal Evaluation (CIE):

There will be CIE for 40 marks, shall be awarded with a distribution of 20 marks for day - to - day performance and timely submission of lab records, 5 marks for viva - voce, 15 marks for internal lab exam (best out of two exams).

#### 8.2.2 Semester End Examination (SEE):

There will be SEE for 60 marks, shall be awarded with a distribution of 15 marks for design/procedure/schematic diagram of the given experiment, 20 marks for conduction of experiment, 15 marks for results and 10 marks for viva - voce. For conducting SEE, one internal examiner and one external examiner will be appointed by the Chief Controller of Examinations of the college. The external examiner should be selected from outside the college among the autonomous / reputed institutions from a panel of three examiners submitted by the concerned Head of the Department.

### 8.3 a. Engineering Drawing:

The distribution of marks is as given below

<b>CIE for Engineering Drawing</b>				
<b>Part</b>	<b>Type of Questions</b>	<b>No. of questions</b>	<b>Marks per question</b>	<b>Total</b>
Part A	Day-to-Day Work			20
<b>Mid – Term Examination</b>				
Part B	Choice Questions [4 out of 6]	4	5	20
<b>Total</b>				<b>40</b>

<b>SEE for Engineering Drawing</b>			
<b>Type of Questions</b>	<b>No. of questions</b>	<b>Marks per question</b>	<b>Total</b>
Either or Choice from each module	5	12	60

### 8.3 b. Machine Drawing:

The distribution of marks is as given below

<b>CIE for Machine Drawing</b>				
<b>Part</b>	<b>Type of Questions</b>	<b>No. of questions</b>	<b>Marks per question</b>	<b>Total</b>
Part A	Day-to-Day Work			20
<b>I Mid Term Examination</b>				
Part B	Choice Questions [4 out of 6]	4	5	20
<b>II Mid Term Examination</b>				
Part B	Choice Questions – Assembly Drawing [1 out of 2]	1	20	20

<b>SEE for Machine Drawing</b>				
<b>Part</b>	<b>Type of Questions</b>	<b>No. of questions</b>	<b>Marks per question</b>	<b>Total</b>
Part A	Choice Questions [2 out of 4]	2	10	20
Part B	Compulsory Questions (Assembly Drawing)	1	40	40
<b>Total</b>				<b>60</b>

### 8.4 Projects:

#### 8.4.1 Mini Project:

There shall be a 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. CIE of 40 marks are awarded based on the report submitted and presentation before the department committee consists of project coordinator, supervisor of the mini - project and a senior faculty member of the department in IV year I semester (VII Semester). SEE of 60 marks will be evaluated by the committee consists of an external examiner, Head of the Department, supervisor of the mini - project and a project coordinator of the department.

#### 8.4.2 Major Project:

Major Project has to be carried out during the VIII semester, as per the instructions of the project supervisor assigned by the Head of the Department. Out of total 100 marks allotted for the major project, 40 marks shall be for **CIE** (Continuous Internal Evaluation) and 60 marks for the **SEE** (Semester End Viva-voce Examination). CIE marks shall be awarded by a Departmental Committee consisting of project coordinator, Supervisor of Major Project and a senior Faculty member, from two reviews (average). Review - I will be conducted within a month from the commencement of class work (problem definition, objective, literature survey and brief discription - each 10 marks) and Review - II will be conducted before second mid examination (progress of work, results, discussion and presentation - each 10 marks). The Major Project Viva-voce (SEE) shall be conducted by a committee comprising of an External Examiner, Head of the Department and Project Supervisor. In SEE of 60 marks, 15 marks for working model / simulation / data collection, 15 marks for report preparation and 30 marks for presentation and viva - voce. The external examiner should be selected by Chief Controller of Examinations from outside the college among the autonomous / reputed institutions from a panel of three examiners submitted by the concerned Head of the Department / Board of Studies (BOS) Chaiman.

### 8.5 Technical Seminar:

For Technical 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 for 100 marks. There shall be no semester end examination for the seminar.

### 8.6 Comprehensive Viva - Voce:

The Comprehensive Viva - Voce shall be conducted in VIII semester for 100 marks. This Viva - Voce is intended to assess the students' understanding of various subjects studied during the B.Tech. programme and will be evaluated by a committee, consisting of the Head of the Department and two senior faculty members. There shall be no external evaluation.

### 8.7 Non-Credit Courses:

#### 8.7.1 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.

#### 8.7.2 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  $\geq 65$  % attendance in such a course. No marks or Letter Grade shall be allotted for these activities.

### 9.0 Grading Procedure

9.1 Marks will be awarded to indicate the performance of each student in each theory subject, or Lab / Practical or Seminar or Project or Minor - Project or Minor Course etc., based on the % marks obtained in CIE + SEE (Continuous Internal Evaluation+ Semester End Examination, 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.

<b>% of Marks</b>	<b>Grade Points</b>	<b>Letter Grade</b>
$\geq 90$	10	O ( Out Standing)
$\geq 80$ to $< 90$	9	A <sup>+</sup> (Excellent)
$\geq 70$ to $< 80$	8	A (Very Good)
$\geq 60$ to $< 70$	7	B <sup>+</sup> (Good)
$\geq 50$ to $< 60$	6	B ( Average)
$\geq 40$ 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  $GP \geq 5$  ('C' Grade or above).
- 9.8** The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points ( $\Sigma CP$ ) secured from ALL Subjects / Courses registered in a semester by the Total Number of Credits registered during that semester. SGPA is rounded off to TWO Decimal Places. SGPA is thus computed as

$$SGPA = \{\sum_{i=1}^N C_i G_i\} / \{\sum_{i=1}^N C_i\} \dots \text{for each semester}$$

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  $i^{\text{th}}$  subject and represents the Grade Points (GP) corresponding to the Letter Grade awarded for that  $i^{\text{th}}$  subject.

- 9.9** The Cumulative Grade Point Average (CGPA) is a measure of the over all 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.

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

(i.e., upto 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 1<sup>st</sup> Semester onwards upto and inclusive of the semester 'S' (obviously  $M > N$ ), 'j' is the subject indicator index (takes into account all subjects from '1' to 'S' semesters) is the number of credits allotted to the  $j^{\text{th}}$  subject, and represents the Grade Points (GP) corresponding to the Letter Grade awarded for that  $j^{\text{th}}$  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	4	A	8	4 x 8 = 32
Course 2	4	O	10	4 x 10 = 40
Course 3	4	C	5	4 x 5 = 20
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	2	B	6	2 x 6 = 12
Course 7	2	A+	9	2 x 9 = 18
Course 8	2	A	8	2 x 8 = 16
	Total Credits 24			Total Credit Points 183

$$SGPA = 183/24 = 7.62$$

**ILLUSTRATION OF CALCULATION OF CGPA:**

Course / Subject	Credits	Letter Grade	Grade Points	Credit Points
<b>I Year I Semester</b>				
Course 1	4	A	8	4 x 8 = 32
Course 2	4	A+	9	4 x 9 = 36
Course 3	4	B	6	4 x 6 = 24
Course 4	3	O	10	3 x 10 = 30
Course 5	3	B+	7	3 x 7 = 21
Course 6	2	B	6	2 x 6 = 12
Course 7	2	A+	9	2 x 9 = 18
Course 8	2	A	8	2 x 8 = 16
<b>I Year II Semester</b>				
Course 9	4	B+	7	4 x 7 = 28
Course 10	4	O	10	4 x 10 = 40
Course 11	4	A	8	4 x 8 = 32
Course 12	3	B	6	3 x 6 = 18
Course 13	3	C	5	3 x 5 = 15
Course 14	2	A+	9	2 x 9 = 18
Course 15	2	O	10	2 x 10 = 20
Course 16	2	A	8	2 x 8 = 16
	Total Credits = 48			Total Credit Points = 376

$$\text{CGPA} = 376 / 48 = 7.83$$

**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  $\geq 5.00$  (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  $\geq 5.00$ ; subject to the condition that he / she secures a GP  $\geq 5$  (‘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 In spite of securing ‘P’ Grade or above in some (or all) Subjects / Courses in any semester, if a student receives a SGPA  $< 5.00$  and / or CGPA  $< 5.00$  at the end of such a semester, then he / she ‘may be allowed’ (on the ‘specific recommendations’ of the Head of the Department and subsequent approval from the Principal) (i) to go into the next subsequent semester (subject to fulfilling all other attendance and academic requirements as listed under 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 Certificate' for Mandatory Course.

9.13 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.

## 10.0 Declaration of Results

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

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

$$\% \text{ of Marks} = (\text{final CGPA} - 0.5) \times 10$$

## 11.0 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 number of 192 Credits (with CGPA  $\geq$  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 12.1, shall be placed in the following classes:

Class Awarded	CGPA
First Class with Distinction	$\geq 8.00$
First Class	$\geq 6.50$ and $< 8.00$
Second Class	$\geq 5.50$ and $< 6.50$
Pass Class	$\geq 5.00$ 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.

## 12.0 With holding 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 with held in such cases.

## 13.0 Transitory Regulations

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

1. A student who has been detained in I year of MR13 / MR14 / MR15 regulations due to lack of attendance, shall be permitted to join I year I Semester of MR17 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 MR13 / MR14 / MR15 regulations for want of attendance shall be permitted to join the corresponding semester of MR17 regulations and is required to complete the study of B.Tech. with in the stipulated period of eight academic years from the date of first admission in I Year. The



MR17 academic regulations under which a student has been readmitted shall be applicable to that student from that semester. See rule (C) for further transitory regulations.

**B. For students detained due to shortage of credits:**

3 A student of MR13 / MR14 / MR15 regulations, who has been detained due to lack of credits, shall be promoted to the next semester of MR17 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 MR17 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 MR17 regulations:**

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

5 The maximum credits that a student acquires for the award of degree, shall be the sum of the total number of credits secured in all the regulations of his / her study including MR17 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 MR17 regulations for exemption details).

6 If a student readmitted to MR17 regulations, has any subject with 80 % of syllabus common with his / her previous regulations, that particular subject in MR17 regulations will be substituted by another subject to be suggested by the College Academic Committee (CAC).

**Note:** If a student readmitted to MR17 regulations, has not studied any subjects / topics in his / her earlier regulations of study which is prerequisite for further subjects in MR17 regulations, the departments concerned shall conduct remedial classes to cover those subjects/topics for the benefit of the students.

## **14.0 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) in spite 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.

## **15.0 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 2018-19

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

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

- The student shall register for 144 credits and secure 144 credits with CGPA  $\geq 5$  from II year to IV year B.Tech. programme (LES) for the award of B.Tech. degree. **Out of the 144 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 138 credits for B.Tech. programme performance evaluation.
- The students, who fail to fulfil the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech.
- 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 29 credits out of 48 credits i.e., 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 58 credits out of 96 credits i.e., 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)

- 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 practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester. The candidate is also debarred for two consecutive semesters from class work and

		all SEE. The continuation of the programme by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4	Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The student is also debarred for two consecutive semesters from class work and all SEE. The continuation of the programme by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
6	Refuses to obey the orders of the Chief Controller of Examinations (CCE) / Controller of Examinations (CE) / Assistant Controller of Examinations (ACE) / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or 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	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police cases registered against them.

	means or misconduct or has the tendency to disrupt the orderly conduct of the examination	
7	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the 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. MECHANICAL ENGINEERING**  
**(Choice Based Credit System)**  
**(MR17 Regulations - Effective from Academic Year 2017-18 onwards)**

<b>I SEMESTER</b>										
<b>S. No.</b>	<b>Category</b>	<b>Course Code</b>	<b>Name of the course</b>	<b>Contact Hours/Week</b>			<b>Credits</b>	<b>Scheme of Valuation</b>		<b>Total Marks</b>
				<b>L</b>	<b>T</b>	<b>P</b>		<b>Internal (CIE)</b>	<b>External (SEE)</b>	
1	BS	70B01	Engineering Mathematics	3	2	-	4	40	60	100
2	BS	70B06	Engineering Physics	4	-	-	4	40	60	100
3	BS	70B10	Applied Chemistry	4	-	-	4	40	60	100
4	ES	70501	Computer Programming	2	2	-	3	40	60	100
5	ES	70201	Basic Electrical and Electronics Engineering	3	-	-	3	40	60	100
6	BS	70B11	Applied Chemistry Lab	-	-	4	2	40	60	100
7	ES	70502	Computer Programming Lab	-	-	4	2	40	60	100
8	ES	70303	Engineering Workshop	-	-	4	2	40	60	100
9	AC	70A01	NSS and Sports/Yoga	-	-	2	-	-	-	-
<b>Total</b>				16	4	14	24	<b>Contact Periods: 34</b>		

II SEMESTER										
S. No.	Category	Course Code	Name of the course	Contact Hours/Week			Credits	Scheme of Valuation		Total Marks
				L	T	P		Internal (CIE)	External (SEE)	
1	HS	70H01	English	3	-	-	3	40	60	100
2	BS	70B02	Computational Mathematics	3	2	-	4	40	60	100
3	BS	70B09	Physics of Materials	3	-	-	3	40	60	100
4	ES	70301	Engineering Graphics	4	-	-	4	40	60	100
5	ES	70302	Engineering Mechanics	4	-	-	4	40	60	100
6	HS	70H02	English Language Lab	-	-	4	2	40	60	100
7	BS	70B07	Engineering Physics Lab	-	-	4	2	40	60	100
8	ES	70304	Engineering Mechanics and Auto CAD Lab	-	-	4	2	40	60	100
9	MC	70M01	Computational Mathematics Lab	-	-	3	-	40	60	100
<b>Total</b>				17	2	15	24	<b>Contact Periods: 34</b>		



III SEMESTER										
S. No.	Category	Course Code	Name of the course	Contact Hours/Week			Credits	Scheme of Valuation		Total Marks
				L	T	P		Internal (CIE)	External (SEE)	
1	BS	70B03	Advanced Calculus	2	2	-	3	40	60	100
2	ES	70305	Fluid Mechanics and Hydraulic Machines	3	-	-	3	40	60	100
3	ES	70306	Metallurgy and Material Science	3	-	-	3	40	60	100
4	ES	70307	Mechanics of Solids	2	2	-	3	40	60	100
5	PC	70308	Kinematics of Machines	2	2	-	3	40	60	100
6	PC	70309	Thermodynamics	3	-	-	3	40	60	100
7	PC	70310	Thermodynamics Lab	-	-	4	2	40	60	100
8	ES	70311	Fluid Mechanics and Hydraulic Machines Lab	-	-	4	2	40	60	100
9	ES	70312	Metallurgy and Mechanics of Solids Lab	-	-	4	2	40	60	100
10	MC	70M03	Environmental Science	-	2	-	-	40	60	100
11	AC	70A03	Internship- I	-	-	-	-	-	-	-
<b>Total</b>				15	8	12	24	<b>Contact Periods: 35</b>		

IV SEMESTER										
S. No.	Category	Course Code	Name of the course	Contact Hours/Week			Credits	Scheme of Valuation		Total Marks
				L	T	P		Internal (CIE)	External (SEE)	
1	BS	70B04	Probability and Statistics	2	2	-	3	40	60	100
2	PC	70313	Machine Drawing	3	-	-	3	40	60	100
3	PC	70314	Dynamics of Machines	4	-	-	4	40	60	100
4	PC	70315	Production Technology	3	-	-	3	40	60	100
5	PC	70316	Thermal Engineering - I	4	-	-	4	40	60	100
6	PC	70317	Design of Machine Members – I	3	-	-	3	40	60	100
7	PC	70318	Kinematics and Dynamics Lab	-	-	4	2	40	60	100
8	PC	70319	Production Technology Lab	-	-	4	2	40	60	100
9	MC	70M02	Gender Sensitization	-	-	3	-	40	60	100
10	AC	70A02	Law for Engineers	-	2	-	-	-	-	-
<b>Total</b>				19	4	11	24	<b>Contact Periods:34</b>		

V SEMESTER										
S. No.	Category	Course Code	Name of the course	Contact Hours/Week			Credits	Scheme of Valuation		Total Marks
				L	T	P		Internal (CIE)	External (SEE)	
1	HS	70H04	Engineering Economics and Accountancy	2	-	-	2	40	60	100
2	ES	70238	Electrical Drives and Micro Processors	3	-	-	3	40	60	100
3	PC	70320	Thermal Engineering - II	2	2	-	3	40	60	100
4	PC	70321	Design of Machine Members – II	2	2	-	3	40	60	100
5	Professional Elective - I									
	PE	70335	Gas Dynamics and Jet Propulsion	3	2	-	4	40	60	100
		70336	Mechanics of Composite Materials							
70337		Applied Hydraulics and Pneumatics								
6	OE	-	Open Elective – I	3	2	-	4	40	60	100
7	HS	70H03	English Communication and Presentation Skills Lab	-	-	2	1	40	60	100
8	PC	70322	Thermal Engineering Lab	-	-	4	2	40	60	100
9	PR	70P01	Technical Seminar	-	-	4	2	100	-	100
10	AC	70A04	MOOCs/ NPTEL certification Course	-	2	-	-	-	-	-
11	AC	70A05	Internship- II	-	-	-	-	-	-	-
<b>Total</b>				15	10	10	24	<b>Contact Periods: 35</b>		

VI SEMESTER										
S. No.	Category	Course Code	Name of the course	Contact Hours/Week			Credits	Scheme of Valuation		Total Marks
				L	T	P		Internal (CIE)	External (SEE)	
1	HS	70H06	Industrial Management	2	-	-	2	40	60	100
2	PC	70323	Metrology and Instrumentation	3	-	-	3	40	60	100
3	PC	70324	Heat Transfer	2	2	-	3	40	60	100
4	PC	70325	Machine Tools	3	-	-	3	40	60	100
5	PC	70326	CAD/CAM	3	-	-	3	40	60	100
6	Professional Elective - II									
	PE	70338	Energy conservation and Energy management	4	-	-	4	40	60	100
		70339	Refrigeration & Air Conditioning							
		70340	Power Plant Engineering							
7	PC	70327	Machine Tools and Metrology Lab	-	-	4	2	40	60	100
8	PC	70328	Heat Transfer Lab	-	-	4	2	40	60	100
9	PC	70329	CAD/CAM Lab	-	-	4	2	40	60	100
10	MC	70M04	Professional Ethics	-	2	-	-	40	60	100
<b>Total</b>				17	4	12	24	<b>Contact Periods: 35</b>		

VII SEMESTER										
S. No.	Category	Course Code	Name of the course	Contact Hours/Week			Credits	Scheme of Valuation		Total Marks
				L	T	P		Internal (CIE)	External (SEE)	
1	PC	70330	Finite Element Method	2	2	-	3	40	60	100
2	PC	70331	Automobile Engineering	3	-	-	3	40	60	100
3	PC	70332	Operations Research	2	2	-	3	40	60	100
4	Professional Elective – III									
	PE	70341	Automation in Manufacturing	2	2	-	3	40	60	100
		70342	Robotics							
		70343	Plant Layout and Material Handling							
5	Professional Elective – IV									
	PE	70344	Design of Press Tools, Jigs and Fixtures	3	-	-	3	40	60	100
		70345	Unconventional Machining Processes							
		70346	Product Design and Development							
6	OE	-	Open Elective –II	3	-	-	3	40	60	100
7	PC	70333	Simulation and Analysis Lab	-	-	4	2	40	60	100
8	PC	70334	Instrumentation and Production Drawing Lab	-	-	4	2	40	60	100
9	PR	70P02	Internship-III(Mini Project)	-	-	2	2	100	-	100
<b>Total</b>				15	6	10	24	<b>Contact Periods: 35</b>		

VIII SEMESTER										
S. No	Category	Course Code	Name of the course	Contact Hours/Week			Credits	Scheme of Valuation		Total Marks
				L	T	P		Internal (CIE)	External (SEE)	
Professional Elective – V										
1	PE	70347	Renewable Energy Sources	3	-	-	3	40	60	100
		70348	Process Planning and Cost Estimation							
		70349	Mechatronics							
Professional Elective – VI										
2	PE	70350	Maintenance and Safety Engineering	3	-	-	3	40	60	100
		70351	Total Quality Management							
		70352	Production Planning and Control							
3	OE		O.E. – III	3	-	-	3	40	60	100
4	PR	70P03	Entrepreneurship	-	2	-	1	40	60	100
5	PR	70P04	Comprehensive Viva-voce	-	-	4	2	100	-	100
6	PR	70P05	Major Project	-	-	18	12	40	60	100
7	AC	70A06	Fine Arts / Foreign Language	-	2	-	-	-	-	-
<b>Total</b>				9	4	22	24	<b>Contact Periods: 35</b>		

**LIST OF OPEN ELECTIVE**

<b>Sl. No.</b>	<b>Branch</b>	<b>Course Code</b>	<b>Name of the Course</b>	<b>No. of Credits</b>
1.	CIVIL	70132	Air Pollution and Control	4
2.	EEE	70241	Electrical Safety and Energy Management	4
3.	MECH	70355	Industrial Safety	4
4.	ECE	70446	Principles of Communication Engineering	4
5.	CSE	70537	Software Quality Assurance and Testing	4
6.	IT	70619	Information Retrieval Systems	4
7.	MINING	72501	Introduction to Mining Engineering	4
8.	MBA	7B159	Training and Organisational Development	4
9.	ENGLISH	70H07	English Language Skills	4
10.	MATHEMATICS	70B15	Transform Techniques	4
11.	PHYSICS	70B17	Advanced Physics for Engineers	4
12.	CHEMISTRY	70B20	Chemistry of Engineering Materials	4
13.	CIVIL	70103	Surveying	3
14.		70150	Green Buildings	3
15.	EEE	70227	Energy Audit and Conservation	3
16.		70240	Energy Storage Systems	3
17.	MECH	70347	Renewable Energy Sources	3
18.		70351	Total Quality Management	3
19.	ECE	70430	Digital Design Using Verilog HDL	3
20.		70438	Satellite Communications	3
21.	CSE	70539	Android Application Development	3
22.		70544	Software Project Management	3
23.	IT	70605	Advanced Java Programming	3
24.		70621	Management Information System	3
25.	MINING	72504	Drilling and Blasting	3
26.		72543	Tunnelling Engineering	3
27.	MBA	7B108	Creativity and Innovations Management	3
28.		7B136	Digital Marketing	3
29.	ENGLISH	70H08	Interpretation Skills and Analytical Writing	3
30.		70H09	World Literature	3
31.	MATHEMATICS	70B14	Applied Statistics	3
32.		70B16	Optimization Techniques	3
33.	PHYSICS	70B18	Nano Materials	3
34.		70B19	NDT and Vacuum Technology	3
35.	CHEMISTRY	70B21	Nano Chemistry	3
36.		70B22	Photochemistry and Spectroscopy	3

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. I Semester</b>		
<b>Code: 70B01</b>	<b>ENGINEERING MATHEMATICS (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>3</b>	<b>2</b>	<b>-</b>

**Prerequisite:** Nil

**Course Objectives:**

The objective of this course is to familiarize the students with linear algebra and elements of mathematics. Differential equations play a major role in understanding many processes and systems that are of interest to the engineers in a generic sense. An in-depth understanding of the ordinary and higher order differential equation are an absolutely essential part of the tool-kit of a well trained engineer. 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. This is specially designed for students to help them bring to speed with other students who have already had some training in mathematics at the 12<sup>th</sup> standard level.

**MODULE I: Matrices and Linear Systems of Equations 12 Periods**

Rank of the matrix - Elementary transformations –Echelon form – Normal form – PAQ Form - Inverse of a Matrix by applying Elementary transformations.

Solution of Linear Systems – Consistency of linear system of equations – Gauss elimination method – LU-Decomposition method –Solution of Tri-diagonal Systems (Thomas Algorithm).

**MODULE II: Eigen Values & Eigen Vectors 13 Periods**

Linear transformation - Eigen values - Eigen vectors – properties – Linearly independent and dependent vectors - Cayley-Hamilton Theorem (without Proof) - Inverse and powers of a matrix by Cayley-Hamilton theorem.

Diagonalization of matrix-Calculation of powers of matrix,– Modal and spectral matrices. Real matrices – Symmetric – skew – symmetric -Orthogonal Matrix. Similarity Transformation - Orthogonal Transformation. Quadratic forms

**MODULE III: Differential Equations of First Order and First Degree 13 Periods**

A: Formation of Differential Equations - Solutions of First order Differential Equations: Homogeneous - Non-homogeneous – Exact - Non-exact.

B: Leibnitz’s Linear Equation - Bernoulli’s Differential Equation. Applications of First Order Differential Equations: Orthogonal trajectories - Newton’s Law of cooling - Law of natural growth and decay.

**MODULE IV: Differential Equations of Second & Higher Order 13 Periods**

Rules for finding Complementary function-Particular integral (Non-homogeneous term of the type  $e^{ax}$ ,  $\sin bx$  /  $\cos bx$ ,  $x^n$ ,  $e^{ax}V(x)$ ,  $x^nV(x)$  only)

Method of variation of parameters. Equations reducible to constant coefficients - Cauchy - Euler and Legendre’s differential equations.



## MODULE V: Laplace Transforms

13 Periods

Definition of Laplace transform, Condition for existence, Laplace transform of standard functions, Properties of Laplace transform, Laplace transform of function when they are multiplied or divided by 't', Evaluation of Integrals by using Laplace transforms.

Inverse Laplace transforms: Finding inverse Laplace transforms using partial fractions, first shifting theorem, Inverse Laplace transforms of derivatives, Convolution theorem, Dirac's delta function, Unit step function. Application of Laplace transforms to ordinary differential equations.

### TEXT BOOKS

1. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons Publishers, 10<sup>th</sup> Edition, Reprint 2010.
2. B.S. Grewal, Khanna, "Higher Engineering Mathematics", Publishers, 43<sup>rd</sup> Edition, Reprint 2011.

### REFERENCES

1. Richard Bellman, "Introduction to Matrix Analysis", Dover Publications, 2<sup>nd</sup> Edition, 1970.
2. R.K. Jain & S.R.K. Iyengar, "Advanced Engineering Mathematics" 3<sup>rd</sup> edition, Narosa Pub. House, Delhi.
3. Kanti B.Datta, "Mathematical Methods of Science and Engineering", Cengage Learning
4. Alan Jeffrey, "Mathematics for Engineers and Scientists", 6<sup>th</sup> Edition, 2013, Chapman & Hall/ CRC.

### E -Resources

1. <http://home.scarlet.be/math/stelsels.htm> (Systems of linear equations & matrices)
2. <https://www.math.ust.hk/~machas/differential-equations.pdf> (Differential equations)
3. [http://www.math.psu.edu/shen\\_w/250/NotesLaplace.pdf](http://www.math.psu.edu/shen_w/250/NotesLaplace.pdf) (Laplace transform)
4. [https://globaljournals.org/GJCST\\_Volume15/4-System-of-Linear-Equations.pdf](https://globaljournals.org/GJCST_Volume15/4-System-of-Linear-Equations.pdf)(Matrices)
5. <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=6541959> (Differential Equations of first order and first degree)
6. <https://www.ijsr.net/archive/v2i1/IJSRON2013331.pdf> (Laplace transforms)
7. <http://nptel.ac.in/courses/122107036/32> (Matrices by Prof Sunita Gakkhar)
8. <http://nptel.ac.in/courses/122107037/20> (Differential Equations of first order and first degree)
9. <http://nptel.ac.in/courses/122107037/14> (Differential Equations of Second & Higher Order)
10. <https://www.youtube.com/watch?v=DPg5T-YBQjU> (Laplace transforms)

### Course Outcomes

At completion of the course, students will be able to

1. Apply the operations on matrices like row, column operations, rank of the matrix and able to check the consistency and inconsistency of the system of equations.
2. Find the eigen values and eigen vectors of the given matrix to analyze the associated spectral matrix. Application of Cayley –Hamilton theorem.
3. Solve the first order first degree differential equations and its applications
4. Understand higher order ordinary differential equations and apply them in bending of beams and circuit problems.
5. Understand Laplace transforms and perform its applications to linear differential equations and real time applications.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. I Semester</b>		
<b>Code: 70B06</b>	<b>ENGINEERING PHYSICS</b> (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>4</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objective:**

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

**MODULE I: Optics 12 Periods**

Principle of superposition, Coherence–Spatial and Temporal; Introduction to Interference, Young’s double slit experiment - Optical path difference and Fringe width; Interference in thin films (Reflected light) Cosine law; Newton’s rings experiment - Determination of wavelength of light. Concept of diffraction, Diffraction grating – resolving power.

**MODULE II: Waves and Oscillations 13 Periods**

Introduction, Differential equation for SHM and its solution; expression for energy of the oscillator; superposition of two linear SHMs (with same frequencies) - Lissajous figures; Damped vibrations - differential equation and its solution, Critical damping, under damping and over damping; Qualitative treatment of Forced vibrations, sharpness of resonance, analogy between mechanical and electrical oscillators.

**MODULE III: Crystal Structures and X-ray Diffraction 13 Periods**

A:Crystal Structures: Space lattice, crystallographic axes, Unit cell, Lattice parameters; Crystal systems, Bravais lattices, Miller indices, Crystal planes and directions, Inter-planar spacing of orthogonal crystal systems, Atomic radius, Coordination number and atomic packing fraction of SC, BCC and FCC lattices, Diamond, ZnS and NaCl structures.

B:X-ray Diffraction: Introduction, Bragg’s law, Laue and Powder methods, Application of XRD to analyze Cubic structure.

**MODULE IV: Principles of Quantum Mechanics 13 Periods**

Postulates of Quantum mechanics, Louis de Broglie's concept of matter waves, Davisson and Germer’s experiment, Heisenberg’s uncertainty principle, Schrödinger’s Time dependent and Independent Wave Equation; Physical Significance and properties of the Wave Function; Energy of a particle in One Dimensional infinite Potential well.

**MODULE V: Nano Materials 13 Periods**

Introduction - Nano scale, Surface to volume ratio and Quantum confinement; Optical properties, Electrical properties; brief description of different methods of synthesis of nano materials - physical (LASER ablation, Ball milling), chemical (Vapor deposition, Sol - gel); Carbon nano-tubes - properties and applications, Applications of nano materials - automobiles, electronics, medical, cosmetics and textile.

## TEXT BOOKS

1. K Vijaya Kumar, S Chandralingam, “**Modern Engineering Physics**” Volume I & II, S. Chand, 1<sup>st</sup> Edition, 2017.
2. M N Avadhanulu, P G Kshirsagar, “**A Textbook of Engineering Physics**”, Revised Edition 2014.

## REFERENCES

1. P K Palanisamy, “**Engineering Physics**”, SciTech Publication, 4<sup>th</sup> 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**” DhanpatRai Publications, Eighth Revised Edition, 2006.
4. D K Bhattacharya, Poonam Tandon, “**Engineering Physics**”, Oxford University Press, 1<sup>st</sup> Edition, 2015.

## E - RESOURCES

1. [https://www.researchgate.net/publication/259574083\\_Lecture\\_Notes\\_on\\_Engineering\\_Physics](https://www.researchgate.net/publication/259574083_Lecture_Notes_on_Engineering_Physics)
2. [https://www.researchgate.net/publication/292607115\\_Applied\\_Physics](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. [https://www.youtube.com/watch?v=jnjjWI1s9\\_s&list=PLzJaFd3A7DZse2tQ2qUFChSiCj7jBidOO](https://www.youtube.com/watch?v=jnjjWI1s9_s&list=PLzJaFd3A7DZse2tQ2qUFChSiCj7jBidOO)
6. <https://www.youtube.com/watch?v=4a0FbQdH3dY>

## Course Outcomes

At completion of the course, students will be able to

1. Be aware of the concepts of Interference, diffraction and its applications.
2. Distinguish free, damped and forced vibrations, develop basic knowledge on the distribution functions and simple applications.
3. Apply the basic principles of crystals and analysis of crystal structures using X-ray diffraction.
4. Acquire the theoretical information about matter in terms of quantum physics.
5. Analyze and apply various synthesis methods of nano materials and its applications.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. I Semester</b>		
<b>Code: 70B10</b>	<b>APPLIED CHEMISTRY</b> (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>4</b>	<b>-</b>	<b>-</b>

**Prerequisite: Nil**

**Course Objective:**

The purpose of this course is to emphasize the relevance of fundamentals and applications of chemical sciences in the field of engineering and to provide basic knowledge on electrochemistry, batteries, corrosion, applications of conducting polymers in various fields, fuels in day to day life and the concepts of composites, Nano materials and green chemistry.

**MODULE I: Water**

**12 Periods**

Hardness of Water: causes of hardness, expression of hardness – units – types of hardness, Alkalinity of water specifications for drinking water (BIS and WHO standards); Estimation of temporary & permanent hardness of water by EDTA method - numerical problems. Boiler troubles – Scale & sludge, Priming and foaming, caustic embrittlement and boiler corrosion; Treatment of boiler feed water – Internal treatment (Phosphate, carbonate and calgon conditioning). External treatment – Lime Soda process and ion exchange process, Numerical Problems. Disinfection of water by chlorination and ozonisation. Desalination by reverse osmosis.

**Module II: Electrochemistry and Corrosion**

**13 Periods**

Electrochemistry: Introduction-Conductance-Specific and Equivalent conductance. Electrochemical cells- EMF, Galvanic Cells, Electrode potential, Calomel Electrode, glass electrode; Nernst equation its applications and numerical problems - Batteries: Primary cells (dry cells) and secondary cells (lead-Acid cell, Ni-Cd cell). Applications of batteries. Fuel cells – Hydrogen – Oxygen fuel cell and its applications.

Corrosion: Causes and effects of corrosion: Theories of corrosion – Chemical & Electrochemical corrosion; Factors affecting rate of corrosion – Nature of metal and Nature of Environment – Corrosion control methods – Cathodic protection (Sacrificial anodic). Surface coatings: Metallic coatings & methods of application of metallic coatings - hot dipping (Galvanization), Cementation, Electroplating (Copper plating), Electroless plating of Nickel.

**Module III: Polymers**

**13 Periods**

A: Types of Polymerization-Chain (Free radical Mechanism) & Step growth. Plastics: Thermoplastic & Thermosetting plastics, Compounding & fabrication of plastics (Compression and injection moulding). Preparation, properties, engineering applications of PVC, Teflon, Nylon – 6,6 and Bakelite.

B: Conducting polymers: Polyacetylene, Polyaniline, Mechanism of Conduction, doping; applications of Conducting polymers. Bio degradable polymers: poly lactic acid and poly vinyl acetate. Elastomers: Natural Rubber-vulcanization. Synthetic Rubber- preparation, properties and applications of BuNa-S, Butyl rubber. Fibre-reinforced polymers-properties and applications.

**Module IV: Fuels and Combustion****13 Periods**

Fuels: Classification – solid fuels: coal – analysis of coal - proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining. Cracking- fixed bed catalytic cracking, synthesis of petrol by Fisher- Tropsch method. Knocking – octane and cetane rating. Gaseous fuels - constituents, characteristics and applications of natural gas, LPG and CNG.

Combustion: Combustion-Definition, Calorific value of fuel – HCV, LCV; Determination of calorific value by Junkers gas calorimeter – Numerical problems on combustion. Renewable energy sources- solar, wind, hydro power and biomass energy advantages, disadvantages and Applications

**Module V: Composites, Nano Chemistry and Green Chemistry****13 Periods**

Composites: Basics of composites, composition and characteristics-types of composites –particle and fiber reinforced composites and their applications. Concept of Bio-fuels (Biodiesel, Bioethanol and Biogas), Biosensors, Biosurfactants.

Nano Chemistry: Introduction and classification of Nanomaterials (Fullerene, Carbon nano tubes and nanowires only) - Application of nanomaterials. Brief introduction to nanocomposites

Green Chemistry: Introduction, principles of green chemistry, introduction to ultrasonic and microwave assisted reactions, solvent free reactions. Concept of R4M4 (Reduce, Reuse, Recycle, Redesign; Multipurpose, Multidimensional, Multitasking and Multi-tracking) model with special reference of Econoburette, Survimeter.

**TEXT BOOKS**

1. P. C. Jain and Monica Jain, “**A text Book of Engineering Chemistry**”, Dhanpat Rai Publications, New Delhi, 12<sup>th</sup> Edition 2006.
2. M. Thirumala Chary and E. Laxminarayana, “**Engineering Chemistry**” by SciTech publications(INDIA) PVT Ltd, Third Edition, 2016 .

**REFERENCES**

1. B. Rama Devi, Ch. VenkataRamana Reddy and Prasantha Rath, “**Text Book of Engineering chemistry**” by Cengage Learning India Pvt.Ltd, 2016.
2. F.W. Billmeyer, “**Text Book of Polymer Science**”, John Wiley & Sons, 4<sup>th</sup> Edition, 1996.
3. M.G. Fontana, N. D. Greene, “**Corrosion Engineering**”, McGraw Hill Publications, New York, 3rd Edition, 1996.
4. B. R. Puri, L. R. Sharma & M. S. Pathania, “**Principles of Physical Chemistry**”, S. Nagin Chand &Co., New Delhi, 23<sup>rd</sup> Edition, 1993.
5. G. A. Ozin and A.C. Arsenault, “**Nanochemistry: A Chemical Approach to Nanomaterials**”, RSC Publishing, 3<sup>rd</sup> Edition, 2005.

**E -Resources**

1. <https://books.google.co.in/books?isbn=0070669325> (Engineering chemistry by Sivasankar)
2. <https://www.youtube.com/watch?v=yQUd2vzfgH8> (Hot dipping Galvanization)
3. Journal of Industrial & Engineering chemistry (Elsevier)
4. Journal of fuel chemistry & Technology (Elsevier)
5. [nptel.ac.in/courses/113108051/](http://nptel.ac.in/courses/113108051/) (corrosion & electrochemistry web course)
6. <http://nptel.ac.in/course.php> (Material chemistry video& web courses)

## **Course Outcomes**

At completion of the course, students will be able to

1. Acquire knowledge on Water treatment, specifically hardness of water.
2. Acquire knowledge on Electrochemical cell, fuel cells, batteries and its applications.
3. Know the properties and uses of polymeric materials.
4. Analyze the combustion mechanism of various types of fuels (solid, liquid, gas)
5. Acquire basic knowledge on the concepts of Composites, Nano and Green Chemistry.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. I Semester</b>		
<b>Code: 70501</b>	<b>COMPUTER PROGRAMMING</b> (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>2</b>	<b>2</b>	<b>-</b>

**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, 2<sup>nd</sup> Edition, 2011.
2. E. Balagurusamy, “**Computer Programming in C**”, Tata McGraw Hill, 1<sup>st</sup> Edition, 2013.

## **REFERENCES**

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

## **E -RESOURCES**

1. [http://oxford.universitypress.ac.in/eBooks/ Programming in C](http://oxford.universitypress.ac.in/eBooks/Programming%20in%20C).
2. <https://www.journals.elsevier.com/science-of-computer-programming>
3. <http://www.ejournalofsciences.org>
4. [http://onlinecourses.nptel.ac.in/iiitk\\_cs-101](http://onlinecourses.nptel.ac.in/iiitk_cs-101)
5. <http://onlinevideolecture.com/ebooks/?subject=C-Programming>

## **Course Outcomes**

At completion 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.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. I Semester</b>		
<b>Code: 70201</b>	<b>BASIC ELECTRICAL AND ELECTRONICS ENGINEERING</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>	(Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	<b>3</b>	<b>-</b>	<b>-</b>

**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: Introduction to Electrical Circuits 10 Periods**

Circuit Concept – R-L-C parameters – Voltage and Current sources – Independent and dependent sources - Source transformation – Voltage and Current relationship for passive elements – Series, parallel, series-parallel, star-to-delta and delta-to-star transformation. Kirchhoff's laws – KCL and KVL, Loop and Nodal analysis of Networks with independent voltage and current sources.

**MODULE II: Magnetic Circuits 9 Periods**

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 III: Single Phase A.C. Circuits 10 Periods**

A: R.M.S and Average values and form factor for sinusoidal wave forms, Steady state analysis of pure R, L and C with sinusoidal excitation.

B: Steady state analysis of series RL, RC, RLC - Concept of Reactance, Impedance, Susceptance and Admittance – Phase and Phase difference – Power factor, Real and Reactive powers.

**MODULE IV: Semiconductor Diode Characteristics 10 Periods**

Qualitative theory of the p-n junction, the p-n junction as a diode, band structure of an open circuited p-n junction, the current components in a p-n diode, quantitative theory of the p-n diode currents, the volt ampere characteristics, the temperature dependence of V-I characteristics, diode resistance, ideal versus practical diodes, diode equivalent circuits, space charge or transition capacitance  $C_T$ , diffusion capacitance, breakdown mechanism in diode, Zener diode, V-I characteristics of Zener diode.

**MODULE V: Diode Applications & Special Semiconductor Devices 9 Periods**

**Diode Applications:** Introduction, load line analysis, series diode configurations, parallel and series-parallel configuration, half-wave rectification, full-wave rectification, general filter considerations, Inductive, Capacitive, LC and CLC filters, Zener diode as voltage regulator.

**Special Semiconductor Devices:** Principle of operation, Characteristics and applications of Tunnel diode, Varactor diode, Photo Diode, LED, LCD.

## **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, 1<sup>st</sup> 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<sup>rd</sup> 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, 2<sup>nd</sup> 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 completion of the course, students will be able to

1. Apply basic laws in electrical circuit.
2. Apply the faraday’s laws of electromagnetism to real world.
3. Analyze the response of AC network.
4. Know the practical importance of Diode and its characteristics.
5. Recognize the operation of Diode and its applications.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. I Semester</b>		
<b>Code: 70B11</b>	<b>APPLIED CHEMISTRY LAB (Common for CE, ME and Min.E)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		<b>-</b>	<b>-</b>	<b>4</b>

**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: (Any ten experiments)**

1. Calibration of Volumetric apparatus.
2. Estimation of 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. Determination of ferrous ion in cement by colorimeter.
8. Determination of viscosity of given liquids.
9. Preparation of Nylon 6,6.
10. Preparation of Thiokol Rubber.
11. Determination of surface tension of given sample using stalagnometer.
12. To Study the inversion of cane sugar by polarimeter.
13. Estimation of  $Mn^{+2}$  ion in  $KMnO_4$  by Colorimeter.

**Course outcomes**

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

1. Estimate the impurities present in water samples.
2. Select lubricants for various purposes.
3. Prepare advanced polymer materials.
4. Know the strength of an acid present in batteries.
5. Find the  $Fe^{+2}$  present in unknown substances/ores using titrimetric and instrumental methods.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. I Semester</b>		
<b>Code: 70502</b>	<b>COMPUTER PROGRAMMING LAB</b> (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		-	-	<b>4</b>

**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. 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, 2<sup>nd</sup> Edition, 2011.
2. E.Balagurusamy, “**Computer Programming in C**”, Tata McGraw Hill, 1<sup>st</sup> Edition, 2013.

## **REFERENCES**

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

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. I Semester</b>		
<b>Code: 70303</b>	<b>ENGINEERING WORKSHOP</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>	(Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	-	-	<b>4</b>

### 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
7. IT workshop – Hardware identification and connectivity, assembling, disassembling and OS Installation

### II. Trades for Demonstration& Exposure

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

### 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 hardware and software installation.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. II Semester</b>		
<b>Code:70H01</b>	<b>ENGLISH</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>	(Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objective:**

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: Minimalism- Live a Meaningful Life** **10 Periods**

- 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 : Knowledge Society** **10 Periods**

- 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

**MODULE III: Half a Rupee Worth** **10 Periods**

- Poem** : **If** by **Rudyard Kipling**
- Grammar** : Tense, aspect and concord
- Vocabulary** : Idiomatic Expressions; Phrasal Verbs
- Reading** : Reading for theme and gist.
- Writing** : Essay Writing

**MODULE IV : Jesse Owens** **10 Periods**

- 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 : Pecuniary Independence****10 Periods****Poem : Human Family by Maya Angelou****Grammar : Direct and Indirect Speech****Vocabulary : Gender sensitive language, integrated exercises in vocabulary****Reading : Reading for specific purposes****Writing : Summarizing**

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

**TEXT BOOKS**

1. T.V.Surnedranath 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, 4<sup>th</sup> Edition, 2009.
2. Chaudhuri, SantanuSinha, 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, 4<sup>th</sup> Edition, 1994.
4. Field, Marion, Improve Your Written English, Kindle books, 5<sup>th</sup> Edition, 2009.
5. G. Leech and J. Svartvik, A Communicative Grammar of English, London: Longman, 3<sup>rd</sup> 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 completion 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.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. II Semester</b>		
<b>Code: 70B02</b>	<b>COMPUTATIONAL MATHEMATICS (Common for CE,EEE,ME,ECE,CSE,IT and Min.E)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>3</b>	<b>2</b>	<b>-</b>

**Prerequisite:** Engineering Mathematics

**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 13 Periods**

Solution of Algebraic and Transcendental Equations: Introduction - Bisection Method - Method of False Position - Iteration Method – Newton-Raphson Method - Ramanujan’s Method.

Gauss Jacobi – Gauss Seidel Methods

**MODULE II: Interpolation 13 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 12 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  $1/3^{\text{rd}}$ ,  $3/8$  Rule.

**MODULE IV: Numerical Solution of Ordinary Differential Equations 13 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 13 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. S.S. Sastry, “**Introductory Methods of Numerical Analysis**”, Prentice-Hall of India Private Limited, 4<sup>th</sup> edition.
2. B.S. Grewal, “**Higher Engineering Mathematics**”, Khanna Publishers, 43<sup>rd</sup> Edition, Reprint 2011.

## REFERENCES

1. R.K. Jain & S.R.K. Iyengar “**Advanced Engineering Mathematics**”, Narosa Publications Delhi, 3rd edition.
2. Kanti B. Datta “**Mathematical Methods of Science and Engineering**”, Cengage Learning Publications.
3. Alan Jeffrey “**Mathematics for Engineers and Scientists**”, Chapman & Hall/, 6<sup>th</sup> Edition 2013.
4. Michael Greenberg “**Advanced Engineering Mathematics**”, Pearson Education Second Edition.

## E –RESOURCES

1. [http://www.simumath.com/library/book.html?code=Alg\\_Equations\\_Examples](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](http://jupiter.math.nctu.edu.tw/~smchang/9602/NA_lecture_note.pdf) (Interpolation)
3. [http://www.essie.ufl.edu/~kgurl/Classes/Lect3421/Fall\\_01/NM5\\_curve\\_f01.pdf](http://www.essie.ufl.edu/~kgurl/Classes/Lect3421/Fall_01/NM5_curve_f01.pdf) (Curve fitting)
4. <http://nptel.ac.in/courses/104101002/downloads/lecturenotes/module1/chapter6.pdf>
  - a. (Numerical Differentiation and Integration)
5. <http://www.sam.math.ethz.ch/~hiptmair/tmp/NPDE10.pdf> (Numerical Solution of Partial Differential Equations)
6. [https://www.jstor.org/stable/27953736?seq=1#page\\_scan\\_tab\\_contents](https://www.jstor.org/stable/27953736?seq=1#page_scan_tab_contents) (Algebraic and transcendental equation by William L. Schaaf)
7. <http://www.ijcsi.org/papers/IJCSI-9-6-2-413-419.pdf> (Algebraic and transcendental equation by Md. Golam Moazzam)
8. <http://www.iosrjournals.org/iosr-jm/papers/Vol6-issue6/J0665862.pdf> (Interpolation)
9. <http://www.wseas.org/multimedia/journals/mathematics/2014/a045706-398.pdf> (Curve fitting)
10. <http://nptel.ac.in/courses/122102009> (Algebraic and transcendental equation)
11. <http://nptel.ac.in/courses/112104035/14> (Mathematical methods in engineering and science by Prof. Bhaskar Dasgupta)
12. <http://nptel.ac.in/courses/111107063> (Numerical solution of Ordinary Differential Equations)
13. <http://nptel.ac.in/courses/111105038> (Numerical Solution of Partial Differential Equations)

## Course Outcomes

At completion of the 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. Find out the Numerical solution of partial differential equations.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. II Semester</b>		
<b>Code: 70B09</b>	<b>PHYSICS OF MATERIALS (Common for CE, ME and Min.E)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Engineering Physics

**Course Objective:**

The main objective of this course is to provide the basic physics principles, would help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches. This would create awareness about the vital role played by science and engineering in the development of new technologies.

**MODULE I: Magnetic Properties of Materials & Superconductivity** **9 Periods**

Magnetic Properties of Materials: Introduction, origin of magnetic moment - Bohr magneton; classification of dia, para and ferro magnetic materials, hysteresis curve, soft and hard ferromagnetic materials, properties of anti-ferro and ferri magnetic materials.

Superconductivity: Concept of Perfect Diamagnetism; Meissner effect ; Type I and II Superconductors; BCS theory (qualitative); High  $T_C$  super conductors; Applications of Superconductors - Smart magnets, SQUIDS, transmission lines, Mag-Lev Train.

**MODULE II: Dielectric Properties of Materials** **9 Periods**

Electric dipole, Dipole moment, Dielectric constant, Polarizability, Electric Susceptibility, Displacement Vector, Electronic, Ionic and Orientation Polarizations and Calculation of Polarizabilities - Electronic and ionic; Qualitative treatment of Internal Fields in solids, Clausius - Mossotti Equation, Piezo-electricity, Ferro- electricity, Barium titanate, Applications of Ferroelectric materials.

**MODULE III: LASER & Fiber Optic Materials** **13 Periods**

A: Laser : Characteristics of LASER; Absorption, Spontaneous and Stimulated transitions; Einstein's Coefficients and Relations between them; Population Inversion; Pumping - Optical and Electrical; Meta-stable State; Three and Four level pumping schemes; Ruby LASER; Helium-Neon LASER; Nd:YAG LASER; Semiconductor Diode LASER; Applications of LASER - drilling, welding, data storage, optical signal processing and nuclear fusion.

B: Fiber Optic Materials: Principle of Optical Fiber; Acceptance angle and Acceptance cone, Numerical Aperture; Step and Graded index Optical Fibers and their Refractive Index profiles; Attenuation in Optical Fibers, Fiber materials, Application of Optical Fibers - Medical, Level sensor and Communication system.

**MODULE IV: Acoustics & Ultrasonics** **9 Periods**

Acoustics: Reverberation & Reverberation time, basic requirements of acoustically good hall; absorption Coefficient, Determination of absorption coefficient based on the standard times of reverberation, Sabine's formula (Qualitative treatment); Factors affecting the architectural acoustics and their remedies.

Ultrasonics: Introduction, Concept of Magnetostriction, Piezo and inverse Piezo electric effects; Production of Ultrasonic waves - Magnetostriction method; Piezo electric crystal method; Properties of Ultrasonic waves; Detection of Ultrasonics - Piezo electric detector, Kundt's tube, Sensitive flame method, Thermal detector; Applications - Communication, Industrial, Biological and Medical.

## **MODULE V: Non Destructive Testing (NDT)**

**8 Periods**

Introduction, Types of Defects, Methods of NDT, visual Inspection, Liquid/dye penetrate testing, magnetic particle testing, Eddy current testing, Ultrasonic inspection method, Advantages, X-ray radiography, X-ray fluoroscopy, comparison of conventional and real time radiography.

### **TEXT BOOKS**

1. K Vijaya Kumar, S Chandralingam, “**Modern Engineering Physics**” Volume I & II, S. Chand, 1<sup>st</sup> Edition, 2017.
2. M N Avadhanulu, P G Kshirsagar, “**A Textbook of Engineering Physics**”, Revised Edition 2014.

### **REFERENCES**

1. P K Palanisamy, "**Engineering Physics**", 4<sup>th</sup> Edition, SciTech Publications, 2014.
2. D K Bhattacharya, PoonamTandon, “**Engineering Physics**”, Oxford University Press, 1<sup>st</sup> Edition, 2015.
3. G Prasad and Bhimashankaram, "**Engineering Physics**", B S Publications, 3<sup>rd</sup> Edition, 2008.
4. R K Gaur and SL Gupta, “**Engineering Physics**” DhanpatRai Publications, Eighth Revised Edition, 2006.

### **E-RESOURCES**

1. <http://www.aep.cornell.edu/academics/upload/PhD-Handbook-11-12-2.pdf>
2. <https://archive.org/details/essentialsofapp1029186mbp>
3. <https://www.youtube.com/watch?v=etjZmdmrjSU>
4. [https://www.youtube.com/watch?v=ooLJ\\_bGKmH8](https://www.youtube.com/watch?v=ooLJ_bGKmH8)
5. <https://www.youtube.com/watch?v=QQZ6EGf0Ju8>
6. <https://www.youtube.com/watch?v=6QUFuZpCgGw>
7. <https://www.youtube.com/watch?v=qUEbxTkPIWI>
8. <http://www.springer.com/physics/journal/340>
9. <http://www.niscair.res.in/sciencecommunication/researchjournals/rejour/ijpap/ijpap0.asp>

### **Course Outcomes**

At completion of the course, students will be able to

1. Distinguish ferro, ferri and anti-ferro magnetic materials and understands different types of superconductors.
2. Recognizes the dielectric properties of matter.
3. Aware of the concepts and applications of LASER and Optical fibers.
4. Analyzes the minimum requirements of Acoustics and also various production and detection methods of Ultrasonics.
5. Know relevant the applications of NDT.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. II - Semester</b>		
<b>Code: 70301</b>	<b>ENGINEERING GRAPHICS</b> (Common to CE, EEE, ECE, CSE, ME, IT and Min.E)	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>4</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objectives:**

The students will be able to understand the manual drawings and getting fundamental knowledge on drafting software.

**MODULE I: Introduction to Engineering Drawing 15 Periods**

Principles of Engineering Graphics and their Significance. Lettering and dimensioning. Geometrical Constructions: Regular polygons only. Curves: Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid, Hypocycloid and Involute. Scales: Construction of different types of scales - Plain, Diagonal and Vernier scale.

**MODULE II: Projection of Points, Lines and Planes 15 Periods**

Principles of Orthographic Projections – Conventions – First Angle projections. Points & Lines: Projection of Points, Projection of Lines- inclined to both the planes. Planes: Projection of Planes – inclined to one plane only.

**MODULE III: Projection of Solids & Section of Solids 15 Periods**

A: Projection of Solids: Projections of regular solids like cube, prism, pyramid, tetrahedron, cylinder and cone by rotating object method. Axis inclined to both the reference planes. B: Section of Solids: Sectioning of above solids in simple vertical position with the cutting plane is inclined to the one plane and perpendicular to the other –true shape of section.

**MODULE IV: Development of Surfaces & Isometric Projections 15 Periods**

Development of Surfaces: Development of lateral surfaces of simple and sectioned solids – prisms, pyramids cylinders and cones. Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions –Plane Figures, Simple and Compound Solids.

**MODULE V: Transformation of Projections & Introduction Auto CAD 15 Periods**

Transformation of Projections: Conversion of Isometric Views to Orthographic Views. Conversion of orthographic views to isometric views – simple objects. Introduction to Auto CAD: Introduction, Salient features of AutoCAD software, Basic commands, construction, editing and dimensioning, two dimensional drawings.

**TEXT BOOKS**

1. N.D. Bhat, “**Engineering Drawing**”, Charotar Publishing House, 53<sup>rd</sup> Edition, 2014.
2. BasantAgrawal, “**Engineering Drawing**”, Tata McGraw Hill, 2<sup>nd</sup> Edition, 2013.

## REFERENCES

1. K.L.Narayana, P. Kannaiah, “**Engineering Drawing**”, SciTech Publishers. 2<sup>nd</sup> Edition, 2013
2. K. Venugopal, “**Engineering Drawing**”, New Age International Publishers, 3<sup>rd</sup> Edition, 2014.
3. K. V. Natarajan, “**A text book of Engineering Graphics**”, Dhanalakshmi Publishers, Chennai, 2015.
4. M.S. Kumar, “**Engineering Graphics**”, D.D. Publications, 2011.
5. Trymbaka Murthy, “**Computer Aided Engineering Drawing**”, I.K. international Publishing House, 3<sup>rd</sup> 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 points, 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 and know the basics of Auto CAD.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. II Semester</b>		
<b>Code: 70302</b>	<b>ENGINEERING MECHANICS (Common for CE, ME and Min.E)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>4</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Engineering Physics

**Course Objectives:**

The objective of this subject is to provide the basic concepts and effect of system forces on rigid bodies, Geometrical Properties of Planes and Solids, problem solving in kinematics and kinetics using different methods and to analyse the types of friction for moving bodies and problems related to friction.

**MODULE I: Introduction to Mechanics & System of Forces 13 Periods**

Introduction: Basic Concepts, Laws of Motion, Force - types, characteristics - Principle of transmissibility - Types of Forces - Concurrent and non-concurrent Forces - Composition of force – Resultant - Triangle, Polygon and Parallelogram Law of Forces - Moment of Force and its Application - Varignon’s theorem, Couples - Free Body Diagrams, Types of Supports and their reactions, Internal and External Forces - Types of Equilibrium, Equations of Equilibrium, Conditions of Equilibrium - Lami’s Theorem.

**MODULE II: Friction, Centroid and Center of Gravity 13 Periods**

Friction: Types of friction, Limiting friction, Laws of friction, static and dynamic frictions, application of laws of friction. Motion of bodies - wedge, screw, screw jack.

Centroid and Center of Gravity: Introduction, Centroids of Lines and Areas - simple figures - Centroid of composite figures. Pappus theorem - Centre of gravity of simple solids, composite solids - Centroids of volumes.

**MODULE III: Projection of Solids & Section of Solids 13 Periods**

A: Area Moment of Inertia: Definition - Moment of Inertia of plane areas, Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures.

B: Mass Moment of Inertia: Introduction-moment of inertia of masses - Radius of gyration- Transfer formula for mass moment of inertia- by integration - Moment of Inertia of composite bodies.

**MODULE IV: Kinematics & Kinetics 13 Periods**

Kinematics: Rectilinear motion - Motion of Rigid Body under uniform and variable accelerations - motion under gravity- curvilinear motion – Projectiles - rotary motion.

Kinetics: Analysis as a Particle and Analysis as a Rigid Body in Translation - D’Alemberts Principle - Connected bodies- Kinetics of rotating bodies.

**MODULE V: Work, Power, Energy & Mechanical Vibrations 12 Periods**

Work, Power and Energy: Introduction, work-energy equation - motion of connected bodies - work done by a spring - general plane motion.

Mechanical Vibrations: Definitions, concepts - simple harmonic motion - free vibrations - Simple and compound pendulums.

## TEXT BOOKS

1. S. Timoshenko, D.H. Young, J.V. Rao and Sukumar Pati, “**Engineering Mechanics**”, Tata McGraw-Hill Education, 5<sup>th</sup> Edition, 2013.
2. K.Vijaya Kumar Reddy, J. Suresh Kumar, “**Engineering Mechanics**”, B S Publications, 3<sup>rd</sup> Edition, 2013.

## REFERENCES

1. Beer, F.P and Johnston Jr. E.R. “**Vector Mechanics for Engineers**”, Tata McGraw-Hill Education 10<sup>th</sup> Edition (India) Pvt Ltd.. 2013.
2. Fedinand. L. Singer, “**Engineering Mechanics**”, Harper & Row Publishers, 3<sup>rd</sup> Edition, 1975.
3. R.S. Khurmi, “**A Text Book of Engineering Mechanics**”, S.Chand Publications, 21<sup>st</sup> Edition, 2007.
4. K L Kumar, “**Engineering Mechanics**”, Tata McGraw Hill Education, 4th Edition, 2011.
5. D.S.Kumar Patil, “**Engineering Mechanics**”, SK Kataria & Sons Publishers, 2<sup>nd</sup> Edition, 2009.

## E - RESOURCES

1. <http://www.mathalino.com/reviewer/engineering-mechanics/equilibrium-force-system>
2. <http://nptel.ac.in/courses/112103109/>
3. <http://ascelibrary.org/journal/jenmdt>
4. <https://tll.mit.edu/sites/default/files/SUTDVVideoThumb/freebodydiagrams.pdf>
5. <http://nptel.ac.in/courses/112106180/>
6. <http://nptel.ac.in/courses/115104094/>

## Course Outcomes

At the end of the course students will be able to

1. Determine the resultant of a system of forces and draw free body diagrams and can frame appropriate equilibrium equations from the free body diagram.
2. Understand and solve the fundamental static problems and able to find centroid and centre of gravity.
3. Determine area and mass moment of inertia for various sections.
4. Apply fundamental concepts of kinetics and kinematics of particles to the analysis of simple practical problems.
5. Understand and solve fundamental work, power and energy related problems and know the concepts of mechanical vibrations.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. II Semester</b>		
<b>Code: 70H02</b>	<b>ENGLISH LANGUAGE LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>	(Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	-	-	<b>4</b>

**Prerequisites:** Nil

**Course Objective:**

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.

**Syllabus: English Language Communication Skills Lab shall have two parts:**

**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.

Minimum Requirement of infra structural facilities for EL Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer aided Language Lab for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners.

**System Requirement (Hardware component):**

Computer network with Lan with minimum 60 multimedia systems with the following specifications:

- a) P – IV Processor
- b) Speed – 2.8 GHZ,
- c) RAM – 512 MB Minimum
- d) Hard Disk – 80 GB
- e) Headphones of High quality

**2. Interactive Communication Skills (ICS) Lab :**The Interactive Communication Skills Lab: A

Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

**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):**

Prescribed Lab Manual: Rani Sudha, “*English Language Communication Skills laboratory*” Manual  
Published by **Pearson Publication**, 5 edition, New Delhi 2014

**REFERENCES**

1. Gairns ,Ruth and Redman , Stuart: Oxford Word Skills, Learn and Practice English Vocabulary, 2<sup>nd</sup> Edition, 2008.
2. Hughes , John and Mallett , Andrew: Successful Presentations: DVD and Student's Book Pack: A Video Series Teaching Business Communication Skillsfor 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, 11<sup>th</sup> Edition, 2011.

**E - RESOURCES**

1. <http://www.mindtools.com/CommSkill/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](http://www.hse.ru/pubs/lib/data/access/ram/ticket/2/14309868938d576a532b71360b7354268380727a22/An%20article%20for%20Monika%20(2010).pdf)

**Course Outcomes**

After completion 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 there by enhances employability skills of the students.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. II Semester</b>		
<b>Code: 70B07</b>	<b>ENGINEERING PHYSICS LAB</b> (Common to CE, EEE, ME, ECE, CSE, IT and Min.E)	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		-	-	4

**Course Objective:**

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:**(Any ten experiments)

1. Magnetic field along the axis of current carrying circular coil- Stewart and Gee's experiment.
2. LASER- Diffraction due to single slit.
3. Newton's Rings.
4. Michelson interferometer (Demonstration only).
5. Melde's Experiment – Longitudinal and Transverse modes.
6. Sonometer- Frequency of A.C supply.
7. The RLC series circuit – Determination of resonant frequency, bandwidth and quality factor.
8. Evaluation of Numerical aperture of the given fiber.
9. Energy band –gap of a material of a P-N junction diode.
10. Torsional Pendulum- Determination of Rigidity modulus of the given wire.
11. LED characteristics.
12. Solar cell characteristics.
13. LASER diode characteristics.

**Course Outcomes**

At completion of the course, students will be 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, usage of new instruments and real time applications in engineering studies.
5. Apply the knowledge of experimental physics in understanding the advanced engineering subjects.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. II Semester</b>		
<b>Code: 70304</b>	<b>ENGINEERING MECHANICS AND AUTOCAD LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>	(Common to CE, EEE, ME, ECE, CSE, IT and Min.E)	-	-	<b>4</b>

### Course Objectives:

The objective of this subject is to provide the basic concept of force, moment of inertia, reaction and moments by practically and development of part drawings for various components drafting software.

Any six experiments from Module – A

### MODULE A: Engineering Mechanics Lab

1. Verification of triangle law and polygon law of forces.
2. Equilibrium of coplanar concurrent force system-forces in the jib crane.
3. To determine the support reaction for a beam.
4. To determine the moment of inertia of a flywheel.
5. Verifying the law of moments by disc apparatus.
6. To determine the coefficient of friction.
7. To study equilibrium of Non Concurrent forces.
8. To verify the equilibrium of forces using force table.

### MODULE B: AutoCAD Lab

**Drafting:** Development of part drawings for various components in the form of orthographic and isometric using AutoCAD software. Representation of dimensioning and tolerances scanning and plotting (2D Drawing).

### Course Outcomes

At completion of the course, students will be able to

1. Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.
2. Apply basic knowledge of mathematics and physics to solve real-world problems.
3. Execute the basic commands using AutoCAD package.
4. Use basic drawing, editing and viewing tools.
5. Prepare a layout.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. II Semester</b>		
<b>Code: 70M01</b>	<b>COMPUTATIONAL MATHEMATICS LAB</b> (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: Nil</b>		-	-	<b>3</b>

**Following Programming is to be done in ‘C’ Language:**

**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 approximation root values in ‘C’ Language.

**MODULE I:**

1. Find the roots of Non-linear equation using Bisection method.
2. Find the roots of Non-linear equation using Regula - falsi method.
3. Find the roots of Non-linear equation using Newton-Raphson method.
4. Find the roots of Non-linear equation using Iteration method.

**MODULE II:**

5. Find the smallest root of non-linear equation using Ramanujan’s method.
6. Solve the system of non-homogeneous linear equations using Gauss-Jacobi method.
7. Solve the system of non-homogeneous linear equations using Gauss-siedal method.
8. Lagrange’s interpolation for unevenly spaced points.

**MODULE III:**

9. Numerical solution of first order O.D.E. using Euler’s method.
10. Numerical solution of first order O.D.E. using 4<sup>th</sup> order Runge-Kutta method.
11. Numerical Integration using Trapezoidal Rule.
12. Numerical Integration using Simpson’s Rule.

**Manual:** Numerical Methods in Engineering & Science (with Programs in C, C++ & MATLAB) by B.S. Grewal, Khanna Publisher, 2014.

**REFERENCES**

1. S.S. Sastry “**Introductory Methods of Numerical Analysis**”, Prentice-Hall of India Private Limited, 4<sup>th</sup> edition.
2. Sankara Rao K. “**Numerical Methods for Scientists and Engineers**”, Prentice-Hall. 7<sup>th</sup> Edition, 2008.

## E-RESOURCES

1. [www.codewithc.com](http://www.codewithc.com) › Numerical Methods › Numerical Methods & C/C++(Source code for Newton Raphson Method in C)
2. [vle.du.ac.in/mod/resource/view.php?inpopup=true&id=13354](http://vle.du.ac.in/mod/resource/view.php?inpopup=true&id=13354) (Solutions of Algebraic and Transcendental Equations –Part I)
3. [www.dailyfreecode.com](http://www.dailyfreecode.com) › Articles › C Programming › Numerical Methods (Code for program of BISECTION METHOD in C Programming)
4. [www.ijcsi.org/papers/IJCSI-9-6-2-413-419.pdf](http://www.ijcsi.org/papers/IJCSI-9-6-2-413-419.pdf) (A Robust method for solving Transcendental Equations by Md.GolamMoazzam)
5. <http://paulbourke.net/miscellaneous/interpolation/> (interpolation)
6. [http://www.tutorialspoint.com/cprogramming/c\\_functions.htm](http://www.tutorialspoint.com/cprogramming/c_functions.htm) (interpolation)
7. <https://www.class-central.com/mooc/2486/nptel-introduction-to-programming-in-c> (Solutions of Algebraic and Transcendental Equations –Part I)
8. <http://freevideolectures.com/Course/2663/Numerical-Methods-and-Programing> (Interpolation)
9. <http://www.nptel.ac.in/courses/111107063/3> (Numerical solution of first order ordinary differential equation)

## Course Outcomes

At completion of the course students will be able to

1. Find the root of an Algebraic and Transcendental equations by using various methods in ‘C’ language.
2. Find the root of non-homogeneous linear equations by using various methods in ‘C’ language.
3. Find the root of first order O.D equations by using various methods in ‘C’ language.
4. Find numerical integrations by using various methods in ‘C’ language.
5. Interpolate the values for unequally spaced points by using various methods in ‘C’ language.

<b>F2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. III Semester</b>		
<b>Code: 70B03</b>	<b>ADVANCED CALCULUS</b> (Common for CE, EEE, ME, ECE, CSE and IT)	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>2</b>	<b>2</b>	<b>-</b>

**Prerequisite:** Nil

**Course Objectives:**

The objective of this course is to familiarize the prospective engineers with techniques in multivariate analysis. It deals with acquainting the students with standard concepts to advanced level that will serve them well towards tackling applications that they would find useful in their profession.

**MODULE I: Differential Calculus 10 Periods**

Rolle's Theorem, Lagrange's Mean Value Theorem, Cauchy's mean value Theorem, Taylor's expansion and Maclaurin's expansion of functions (Without Proofs).

Differentiability of multivariable functions: Jacobian, Functional dependence, Taylor's theorem of two variables (Without Proof) Maxima and Minima of functions of two variables, Lagrange's method of multipliers.

**MODULE II: Multiple Integrals 10 Periods**

Multiple integrals- double integrals, Change of order of integration, change of variables- polar and Cartesian coordinates. Triple integrals, change of variables- spherical, cylindrical coordinates.

**MODULE III: Vector Differentiation 10 Periods**

A: Scalar and Vector Point functions - Gradient - Directional derivative – Divergence – Curl and Their Physical Interpretation.

B: Irrotational fields and Scalar potentials - angle between two surfaces. Vector Identities.

**MODULE IV: Vector Integration 09 Periods**

Line integrals – Work done by a force – Circulation - Potential function, Surface integrals - volume integrals.

Vector integral theorems: Verification of Gauss's Divergence Theorem, Green's and Stoke's theorems (without proof).

**MODULE V: Partial Differential Equations 09 Periods**

Introduction to Partial differential equations – Formation – Elimination of arbitrary constants – Elimination of arbitrary functions. Linear Partial differential equations - Lagrangian subsidiary Equations. Non-Linear Partial Differential equations of first order (standard forms). Charpit's method.



## TEXT BOOKS

1. Kreyszig “**Advanced engineering Mathematics**” John Wiley & Sons, 10<sup>th</sup> Edition, 2010
2. B.S. Grewal “**Higher Engineering Mathematics**” Khanna Publishers, 43<sup>rd</sup> Edition, 2014.

## REFERENCES

1. R.K. Jain & S.R.K. Iyengar, “**Advanced Engineering Mathematics**”, Narosa Publications, 4th edition 2014.
2. Kanti B.Datta, “**Mathematical Methods of Science and Engineering**”, Cengage Learning, First Edition, 2011.
3. Tom M.Apostol, “**Calculus**”, volume-II, John Wiley, Second Edition.

## E - RESOURCES

1. <https://www.math.cmu.edu/~wn0g/2ch6a.pdf> (Differential Calculus)
2. <http://www.staff.ttu.ee/~lpallas/multipleintegrals.pdf> (Multiple Integrals)
3. <http://www.mecmath.net/calc3book.pdf> (Vector Calculus)
4. [https://mat.iitm.ac.in/home/sryedida/public\\_html/caimna/pde/second/second.html](https://mat.iitm.ac.in/home/sryedida/public_html/caimna/pde/second/second.html) (Partial Differential Equations)
5. <http://www.aidic.it/cet/16/51/055.pdf> (Differential Calculus)
6. <http://www.sciencedirect.com/science/article/pii/0022247X7690216X> (Multiple Integrals)
7. <https://www.youtube.com/watch?v=lxF2rqry2LM> (Differential Calculus)
8. <http://nptel.ac.in/courses/122104017/28> (Multiple Integrals)
9. <http://nptel.ac.in/courses/111103021/> (Partial Differential Equations)

## Course Outcomes

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

1. Learn the concept of slope of a curve which can be mapped to functions to evaluate mean values and applications of functions of several variables.
2. Understanding the concepts of double and triple integrals in engineering problems.
3. Apply the concept of Gradient, Divergence and Curl of a vector valued functions and scalar valued functions.
4. Verifying the Vector Integral theorems in engineering and physical problems.
5. Understand Partial Differential equations and perform its applications to real time applications.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. III Semester</b>		
<b>Code: 70305</b>	<b>FLUID MECHANICS AND HYDRAULIC MACHINES</b> [Common to EEE, ME and Min.E]	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**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 – manometric 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, 19<sup>th</sup> Edition, 2013
2. R.K. Bansal, “**Fluid Mechanics and hydraulic Machines**”, Laxmi Publications, 9<sup>th</sup> Edition, 2010.

## **REFERENCES**

1. R.K. Rajput, “**Fluid Mechanics and Hydraulic Machines**”, S.Chand, 5<sup>th</sup> 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, 7<sup>th</sup> Edition, 2007

## **E - RESOURCES**

1. [nptel.ac.in/courses/112105183/](http://nptel.ac.in/courses/112105183/)
2. [www.nptelvideos.in/2012/11/fluid-mechanics.htm](http://www.nptelvideos.in/2012/11/fluid-mechanics.htm)
3. [nptel.ac.in/courses/112104117/](http://nptel.ac.in/courses/112104117/)
4. [www.sanfoundry.com/best-reference-books-fluid-mechanics-and-machinery/](http://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.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. III Semester</b>		
<b>Code: 70306</b>	<b>METALLURGY AND MATERIAL SCIENCE</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites: Applied Chemistry**

### **Course Objectives**

Metallurgy may be defined as the art and science of extracting metals from their ores and adapting these metals to satisfy human requirement to know the Structure & crystallization of metals also grain boundaries & properties of metals. Apply the knowledge of Physical sciences (basic sciences) and translates this knowledge to understand crystal or amorphous nature of materials various engineering materials, their characteristics and their applications is considered to be the major objective of this course.

### **MODULE I: Crystallography & Constitution of Alloys 10 Periods**

Crystallography: Review of crystal structure, space lattice, crystal planes and crystal directions, co-ordination number, number of atoms per unit cell, atomic packing factor, Numerical related to crystallography. Imperfection in metal crystals: Crystal imperfections and their classifications, point defects, line defects, edge & screw dislocations.

Constitution of Alloys: Necessity of alloying, types of solid solutions, Hume Rothery's rules, intermediate alloy phases and electron compounds.

### **MODULE II: Equilibrium of Diagrams and Phase Transformations 10 Periods**

Equilibrium of Diagrams: Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction.

Phase Transformations: Transformations in the solid state– allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, Bi-Cd, Cu-An, Cu-Sn and Fe-Fe<sub>3</sub>C.

### **MODULE III: Cast Irons & Steels 10 Periods**

A: Cast Irons: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheroidal graphite cast iron and alloy cast irons.

B: Steels: Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

### **MODULE IV: Heat treatment of Alloys & Non-ferrous Metals and Alloys 09 Periods**

Heat treatment of Alloys: Effect of alloying elements on Fe-Fe<sub>3</sub>C system, Annealing, normalizing, Hardening, TTT diagrams, tempering, hardenability, surface hardening methods, Age hardening treatment, Cryogenic treatment of alloys.

Non-ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminum and its alloys, Titanium and its alloys. Jomney end quench test apparatus and working description

## **MODULE V: Ceramic materials & Composite materials**

**09 Periods**

Ceramic materials: Crystalline ceramics, glasses, cermets, abrasive materials, nano-materials–definition, properties and applications.

Composite materials: Classification of composites, various methods of component manufacture of composites, particle reinforced materials, fiber reinforced materials, metal ceramic mixtures, metal-matrix composites and C-composites.

### **TEXT BOOKS**

1. Kodgire V D, Sushil Kodgire, “**Material Science and Metallurgy for Engineers**”, Everest Publishing House, ISBN: 9788186314005, 8186314008, 39<sup>th</sup> edition, 2017.
2. V. Rahghavan “**Elements of Material science**”, PHI Publications, 6th edition, 2015

### **REFERENCES**

1. Agarwal, “**Science of Engineering Materials**”, Tata McGrawHill, 8th edition, 2012.
2. William D callister, “**Materials Science and Engineering**”, 8th edition, 2010., 4<sup>th</sup> Edition 2002.
3. Pakirappa, “**Materials Science and Engineering**”, 6th edition, 2013
4. SidneyH.Avener “**Introduction to Physical Metallurgy**”, Tata McGraw Hill publications, 2nd edition, 2013.

### **E - RESOURCES**

1. <http://nptel.ac.in/courses/113106032/>
2. <https://link.springer.com/journal/10853>
3. <https://www.journals.elsevier.com/materials-science-and-engineering-a/>

### **Course Outcomes**

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

1. Know the necessity of alloying, solid solutions and Hume Rothery rules.
2. Know the experimental methods of equilibrium diagrams, cooling and heating of alloys, Lever rule & study about Fe-Fe<sub>3</sub>C (Iron carbide) diagram.
3. Know the Cast Iron and Steel types with structures and applications.
4. Know about Heat treatment of alloys, methods of heat treatment study about TTT diagram and achieve knowledge in surface hardening techniques.
5. Understand the Structure and properties of copper, Aluminum, Titanium and its alloys, Ceramic material and its classification, properties and its application.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. III Semester</b>		
<b>Code: 70307</b>	<b>MECHANICS OF SOLIDS</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>2</b>	<b>2</b>	<b>-</b>

**Prerequisites:** Physics of Materials and Engineering Mechanics

**Course Objectives:**

The objective of this subject is to provide the basic concepts of mechanical behavior of the materials under various loads, provides knowledge on shear force and bending moment diagrams of beams and knowledge about stress distribution across various cross sections of beams.

**MODULE I: Simple Stresses & Strains** **10 Periods**

Elasticity and plasticity – Types of stresses & strains – Hooke’s law – stress–strain diagram for ductile and brittle material–Working stress–Factor of safety–Lateral strain, Poisson’s ratio & volumetric strain.

Elastic Module & the relationship between them–Bars of varying section–composite bars–Temperature stresses. Strain energy – Resilience–Gradual, sudden, impact and shock loadings

**MODULE II: Shear Force and Bending Moment** **10 Periods**

Definition of beam –Types of beams–Concept of shear force and bending moment–SF and BM diagrams for cantilever, simply supported and overhanging beams subjected to point loads, UDL, UVL and combination of these loads–Point of contra flexure–Relation between SF and BM and rate of loading at section of a beam.

**MODULE III: Bending Stresses & Shear Stresses** **10 Periods**

A: Bending Stresses: Theory of simple bending– Assumptions– Neutral axis – Derivation of bending equation:  $M/I=f/y=E/R$  –Determination bending stresses– section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections–Design of simple beam sections.

B: Shear Stresses: Derivation of formula – Shear stress distribution across various beam sections - rectangular, circular, triangular, I, T and angle sections.

**MODULE IV: Deflection of Beams &Torsion** **09 Periods**

Deflection of Beams: Bending into a circular arc–slope, deflection and radius of curvature – Differential equation for the elastic line of a beam– Double integration and Macaulay’s methods– Determination of slope and deflection for cantilever and simply supported beams subjected to point loads- UDL - uniformly varying load.

Torsion: Theory of pure torsion - Assumptions – Derivation of torsion equation, polar section modulus – power transmitted by shafts – combined bending and torsion.

**MODULE V: Analysis of Pin Jointed Plane Frames & Thin Cylinders** **09 Periods**

Analysis of Pin- Jointed Plane Frames: Determination of forces in the members of various types of cantilever & simply supported trusses using (i) Method of Joints (ii) Method of Sections.

Thin Cylinders: Thin seamless cylindrical shells–Derivation of formula for longitudinal and circumferential stresses– hoop, longitudinal and volumetric strains– changes in diameter and volume of thin cylinders.

## **TEXT BOOKS**

1. S.Timshenko “**Strength of Materials**”, D. Van Nostr and Company, inc., 3<sup>rd</sup> edition, 1983
2. Ramamrutham “**Strength of materials**”, Dhanpat Rai Publishing Company, 18<sup>th</sup> edition, 2014

## **REFERENCES**

1. R..K. Rajput, “**Strength of Materials**” S. Chand company Pvt, 5<sup>th</sup> edition, 2014
2. R K Bansal “**Strength of Materials**” Lakshmi – publications, 6<sup>th</sup> edition, 2015
3. Bhavikatti “**Strength of materials**” Lakshmi publications, 4<sup>th</sup> edition, 2014.
4. R S Khurmi, “**Strength of Materials**” S Chand, revised edition, 2013.
5. D S Kumar, “**Strength of Materials**, S K Kataria & Sons, Reprint 2013.

## **E - RESOURCES**

1. [nptel.ac.in/courses/112107147](http://nptel.ac.in/courses/112107147)
2. [nptel.ac.in/courses/Web course-contents/.../strength%20of%20materials/homepage.htm](http://nptel.ac.in/courses/Web%20course-contents/.../strength%20of%20materials/homepage.htm)
3. [www.springer.com](http://www.springer.com) › Home › Materials › Characterization & Evaluation of Materials
4. [discovermagazine.com/tags/strength of materials](http://discovermagazine.com/tags/strength%20of%20materials)
5. [nptel.ac.in/courses/105105108/](http://nptel.ac.in/courses/105105108/)
6. [nptel.ac.in/courses/105105108/30](http://nptel.ac.in/courses/105105108/30)

## **Course Outcomes**

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

1. Describe the fundamentals about the simple stresses, strains and deformation in components due to external loads.
2. Draw the shear force and bending moment diagrams for various beams.
3. Understand bending stress and shear stress.
4. Determine the deflection of beams and torsion.
5. Solve pin joint, thin cylinder problems.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. III Semester</b>		
<b>Code: 70308</b>	<b>KINEMATICS OF MACHINES</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>2</b>	<b>2</b>	<b>-</b>

**Prerequisites:** Engineering Mechanics & Engineering Graphics

**Course Objectives:**

The objective of this subject is to provide basic concept of Mechanisms used in different machine elements like cams, gears and other power transmitting elements.

**MODULE I: Mechanisms & Machines 10 Periods**

Mechanisms: Elements or Links, Classification, Rigid Link, flexible and fluid link, Types of kinematic pairs, sliding, turning, rolling, screw and spherical pairs, lower and higher pairs, closed and open pairs, constrained motion, completely, partially or successfully constrained and incompletely constrained.

Machines: Mechanism and machines, classification of machines, kinematic chain, inversion of mechanisms, inversions of quadratic cycle chain, single and double slider crank chains.

**MODULE II: Straight Line Motion Mechanisms, Steering Mechanisms & Hooke's Joint 10 Periods**

Straight Line Motion Mechanisms: Exact and approximate copiers and generated types Peaucellier, Hart and Scott Russel, Grasshopper, Watt T.Chebicheff and Robert Mechanisms and straight line motion, Pantograph.

Steering Mechanisms: Conditions for correct steering, Davis Steering gear, Ackerman's steering gear mechanisms, velocity ratio. Hooke's Joint – Single and double Hooke's joint, Universal coupling application problems.

**MODULE III: Kinematics & Plane motion of body 10 Periods**

A: Kinematics: Velocity and acceleration - Motion of link in machine - Determination of Velocity and acceleration diagrams - Graphical method - Application of relative velocity method four bar chain. Analysis of Mechanisms: Analysis of slider crank chain for displacement, velocity and acceleration of slider - Acceleration diagram for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration.

B: Plane motion of body: Instantaneous centre of rotation, centroids and axodes - relative motion between two bodies - Three centres in line theorem - Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

**MODULE IV: Cams & Analysis of Motion of Followers 09 Periods**

Cams: Definitions of cam and followers, their uses, types of followers and cams, terminology. Types of follower motion - Uniform velocity, Simple harmonic motion and uniform acceleration. Maximum velocity and maximum acceleration during outward and return strokes in the above three cases.

Analysis of motion of followers: Roller follower circular cam with straight, concave and convex flanks.



## **MODULE V: Gears & Gear Trains**

**09 Periods**

Gears: Higher pairs, friction wheels and toothed gears, types, law of gearing, condition for constant velocity ratio for transmission of motion, Forms of teeth: cycloidal and involute profiles. Velocity of sliding phenomena of interferences, Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact - Introduction to Helical, Bevel and worm gearing.

Gear Trains: Introduction - Train value - Types - Simple and reverted wheel train, Epicyclic gear train. Methods of finding train value or velocity ratio - Epicyclic gear trains. Selection of gear box - Differential gear for automobiles.

### **TEXT BOOKS**

1. Thomas Bevan “**Theory of Machines**”, CBS Publishers, 3<sup>rd</sup> edition, 2005
2. S.S.Rattan “**Theory of Machines and Mechanisms**”, Tata McGraw Hill Publishers, 4<sup>th</sup> edition, 2014.

### **REFERENCES**

1. Shiegley “**The Theory of Machines**” , Oxford University Press, 5<sup>th</sup> edition, 2017.
2. JS Rao and RV Duggipati, “**Mechanism and Machine Theory**”, New Age International Publishers, 2<sup>nd</sup> edition, 1992.
3. R.K Bansal “**Theory of Machines**”, Laxmi Publication, 4<sup>th</sup> edition, 2006
4. R.S. Khurmi and J K Gupta “**Theory of Machines**”, S Chand Publisher, 14<sup>th</sup> edition, 2008.
5. B.V. R. Gupta, “**Theory of Machines**”, I. K. International Publishers, 2<sup>nd</sup> edition, 2011

### **E - RESOURCES**

1. [www.umt.fme.vutbr.cz/~ruja/vyuka/kinematics/LectureNotes.pdf](http://www.umt.fme.vutbr.cz/~ruja/vyuka/kinematics/LectureNotes.pdf).
2. [ebooks.library.cornell.edu/k/kmoddl/pdf/016\\_002.pdf](http://ebooks.library.cornell.edu/k/kmoddl/pdf/016_002.pdf)
3. [www.springer.com/la/book/9789400711556](http://www.springer.com/la/book/9789400711556)
4. [tps://www.elsevier.com/journals/mechanism-and-machine-theory/0094-114X?...](http://tps://www.elsevier.com/journals/mechanism-and-machine-theory/0094-114X?...)
5. [www.nptelvideos.in/2012/12/kinematics-of-machines.html](http://www.nptelvideos.in/2012/12/kinematics-of-machines.html)
6. [nptel.ac.in/courses/112104121/16](http://nptel.ac.in/courses/112104121/16)

### **Course Outcomes**

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

1. Understand different kinematic links and pairs used in mechanisms.
2. Understand different mechanisms.
3. Understand various concepts of mechanisms like straight line motion mechanisms, steering gear mechanisms and the importance of universal (Hooke’s) joint.
4. Practice velocity, acceleration diagram of various mechanism.
5. Understand various motions of cam and follower and belt and rope drives.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. III Semester</b>		
<b>Code: 70309</b>	<b>THERMODYNAMICS</b> <i>(Use of standard Psychrometry charts is permitted)</i>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** NIL

**Course Objectives:**

To understand the basic concepts of thermodynamics applied in devices/machines employed in industries/other applications like heat engines, automobiles, heat transfer, refrigeration & air conditioning.

**MODULE I: Introduction & Zeroth Law of Thermodynamics** **10 Periods**

Introduction: System – Control volume –Surrounding – Boundaries – Universe – Types of systems – Macroscopic and Microscopic viewpoints –Concept of continuum –Thermodynamic equilibrium, State, Property, Process, Cycle and reversibility–Quasi-static process –Irreversible process, Causes of irreversibility–Energy in state and in transition – Types – Work and Heat – Point and Path function.

Zeroth Law of Thermodynamics: Concept of quality of Temperature– Principles of Thermometry– Reference Points–Constant Volume gas Thermometer–Scales of Temperature, Ideal Gas Scale – PMM I – Joule’s Experiments – First law of Thermodynamics – Corollaries– First law applied to process and applied to a flow process– Steady Flow Energy Equation.

**MODULE II: Second Law of Thermodynamics** **10 Periods**

Second Law of Thermodynamics –Thermal Reservoir – Heat Engine, Heat pump, Parameters of performance, Second law of thermodynamics, Kelvin-Planck and Clausius statements and their equivalence/corollaries, PMM of second kind.

Carnot’s principle, Carnot cycle and its specialties, Thermodynamic scale of Temperature, Clausius Inequality, Entropy, Principle of entropy increase –Energy equation –Availability and irreversibility –Thermodynamic potentials –Gibbs and Helmholtz functions –Maxwell relations – Elementary treatment of the Third law of Thermodynamics.

**MODULE III: Perfect Gas Laws & Pure Substances** **10 Periods**

A: Perfect Gas Laws: Equation of State –specific and Universal gas constants – Various Non-flow processes –Properties –End states –Heat and Work Transfer –Changes in Internal Energy– Throttling and free expansion processes–Flow processes–Deviations from perfect gas model– Vander Waals equation of state– Compressibility charts– Variable specific Heats– Gas Tables.

B: Pure Substances: PVT surface, T-s and h-s diagrams, Phase transformations–Triple point – Critical state –Properties during change of phase, Dryness Fraction – Clausius – Clapeyron Equation – Property tables. Various Thermodynamic processes and energy Transfer– use of Mollier charts - Steam Calorimetry.

#### **MODULE IV: Power Cycles & Mixtures of Perfect Gases**

**09 Periods**

Power Cycles: Otto, Diesel, Dual cycles –Sterling cycle –Atkinson cycle – Ericsson cycle – Lenoir cycle–Description and representation on P–V and T-S diagram –Thermal efficiency, Mean effective pressures on Air standard basis– Comparison of Cycles.

Mixtures of perfect Gases–Mole Fraction, Mass fraction – Gravimetric and volumetric analysis– Dalton’s law of partial pressure –Avogadro’s law of additive volumes–Mole fraction –Volume fraction and partial pressure –Equivalent gas constant and Molecular Internal Energy, Enthalpy, Specific heats and Entropy of mixture of perfect gases and Vapour - Atmospheric air.

#### **MODULE V: Refrigeration Cycles & Introduction to Psychrometry**

**09 Periods**

Refrigeration Cycles: Brayton cycle –Performance evaluation–Combined cycles –Bell-Coleman cycle, Vapour compression cycle – Performance Evaluation.

Introduction to Psychrometry: Psychrometric properties–Dry bulb temperature – Wet bulb temperature –Dew point temperature –Thermodynamic Wet bulb temperature –Specific humidity – Relative humidity –Saturated air –Vapour pressure –Degree of saturation–Adiabatic Saturation – Carrier’s Equation–Psychrometric chart.

#### **TEXT BOOKS**

1. Yunus Cengel & Boles, “**Thermodynamics an Engineering Approach**”, 7<sup>th</sup> edition TMH, 2010
2. P.K. Nag “**Engineering Thermodynamic**”,TMH, 5<sup>th</sup> Edition, 2013.

#### **REFERENCES**

1. Doolittle, “**Thermodynamics for Engineers**”, John Wiley & Sons,1984
2. Sonntag& Van Wylen, “**Fundamentals of Thermodynamics**”, Wiley, 8<sup>th</sup> Edition,2014
3. S.R. de Groot, “**Non Equilibrium Thermodynamics**”, Courier corporation, 1<sup>st</sup> Edition,2013
4. P.L.Dhar, “**Engineering Thermodynamics**”,Elsevier,2008.
5. Jones & Dugan “**Engineering Thermodynamics**”, Prentice Hall Publisher, 1<sup>st</sup> Edition, 1996

#### **E - RESOURCES**

1. <http://ores.su/en/journals/international-journal-of-applied-thermodynamics>
2. <https://www.journals.elsevier.com/the-journal-of-chemical-thermodynamics>
3. <http://www.sciencedirect.com/science/book/9780444633736>
4. <http://nptel.ac.in/courses/112103016/>
5. <http://nptel.ac.in/courses/112105123/>
6. <http://nptel.ac.in/courses/101104063/>

#### **Course Outcomes**

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

1. Understand the first law of thermodynamic principles and their relevance to the problems.
2. Understand the second law of thermodynamic principles and their relevance to the problems.
3. Apply the different fundamentals of perfect gases and their mixtures to practical problems.
4. Understand different power cycles and mixture of perfect gases.
5. Know different refrigeration cycles, Psychrometric properties.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. III Semester</b>		
<b>Code: 70310</b>	<b>THERMODYNAMICS LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		-	-	<b>4</b>

### **Course Objectives:**

Student will be able to learn experimental methods of determining the fuel properties like viscosity, calorific value, flash point and fire point.

### **List of Experiments**

1. Determination of Flash and Fire points of Liquid fuels by Pensky-Martins closed cup.
2. Determination of Flash and Fire points of Liquid fuels by Cleveland open cup.
3. Determination of Carbon residue of a given fuel.
4. Determination of Viscosity by Say bolt Viscometer.
5. Determination of Viscosity by Redwood Viscometer.
6. Determination of Calorific value of Solid/Liquid by Bomb Calorimeter.
7. Determination of penetration of given Grease sample.
8. Determination of calorific value of Gaseous fuels using Junkers Gas Calorimeter.
9. Determination of the Coefficient of friction using Thurston oil Tester.
10. Evaluate performance parameters of Mechanical Heat pump.
11. Determination of Flash and Fire points of Lubricants by Pensky-Martins closed cup.
12. Determination of Flash and Fire points of Lubricants by Cleveland open cup.

### **Course Outcomes**

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

1. Understand the Flash and Fire Points of different Fuels.
2. Understand the Flash and Fire Points of different oils.
3. Understand the viscosity of different oils.
4. Understand the Calorific values of fuels using Calorimeters.
5. Understand the Coefficient of Performance of Heat Pump.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. III Semester</b>		
<b>Code: 70311</b>	<b>FLUID MECHANICS AND HYDRAULIC MACHINES LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:2</b>	[Common to EEE, ME and Min.E]	-	-	<b>4</b>

### **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.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. III Semester</b>		
<b>Code:70312</b>	<b>METALLURGY AND MECHANICS OF SOLIDS LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		-	-	<b>4</b>

### **Course Objectives:**

Students will be able to experimentally learn the microstructure, compositions and various mechanical properties of the metals and alloys

### **List of Experiments**

#### **METALLURGY LABORATORY**

1. Preparation and study of the microstructure of steels.
2. Study of microstructures of cast irons.
3. Preparation and study of the microstructure of non ferrous alloys.
4. Preparation and study of the microstructure of heat treated steels.
5. Hardenability of steels by Jomney end quench test.
6. To find out the hardness of various treated and untreated steels.

#### **MECHANICS OF SOLIDS LABORATORY**

1. Tensile test using UTM.
2. Bending test on a) simply supported beam b) cantilever beam.
3. Torsion test.
4. Hardness test on a) Brinell hardness tester b) Rockwell hardness tester.
5. Test on springs a) compression spring b) tension spring.
6. Impact test a) Izod b) Charpy.
7. Fatigue test.
8. Hoop stress and strain relationship for the Thin Cylinder.

### **Course Outcomes**

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

1. Understand the microstructures of various metals and alloys.
2. Identify the methods of heat treatment for varying the hardness.
3. Understand the measurement of bending and tensile forces using UTM.
4. Understand the hardness, tension, compression and impact testing measurement methods for metals.
5. Find out the Young's modulus of some engineering materials.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. III Semester</b>		
<b>Code:70M03</b>	<b>ENVIRONMENTAL SCIENCE</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: Nil</b>	(Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	-	2	-

**Prerequisite: 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.

**MODULE II: Natural Resources, Biodiversity and Biotic Resources 8 Periods**

Natural Resources: Classification of Resources: Living and Non-Living resources, Renewable and non-renewable resources. Water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources – case studies. Energy resources: growing energy needs, introduction to renewable and non renewable energy sources.

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

**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 to 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.

**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.

## **MODULE V: Towards Sustainable Future**

**6 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 2<sup>nd</sup> Edition, 2005.
2. Anubha Kaushik, C.P.Kaushik, “**Environmental studies**” New age International Publishers,4<sup>th</sup> Edition,2012.

### **REFERENCES**

1. Erach Bharucha,“**Environmental studies**” University Grants Commission, and University Press, 1<sup>st</sup>Edition, 2005.
2. M.Anji Reddy “**Text book of Environmental Science and Technology**” 3<sup>rd</sup> Edition, 2007
3. Richard T.Wright,“**Environmental Science: towards a sustainable future**”, PHL Learning, Private Ltd. New Delhi, 2<sup>nd</sup> Edition., 2008
4. Gilbert McMasters and Wendell P.Ela,“**Environmental Engineering and science**”,3<sup>rd</sup> 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/](http://nptel.ac.in/courses/120108004/) (Principles of Environment Management Lectures).
6. <http://www.nptelvideos.in/2012/12/fundamentals-of-environmental-pollution.html> (NPTEL online video courses IIT lectures).

### **COURSE OUTCOMES**

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

1. Realize the importance of ecosystem, its structure, services and make aware of different natural functions of ecosystem, which helps to sustain the life on the earth.
2. Use natural resources more efficiently.
3. Make the aware of the impacts of human actions on the environment, its effects and minimizing measures to mitigate them.
4. Educate the students regarding environmental issues and problems at local, national and international level.
5. Know more sustainable way of living.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. III Semester</b>		
<b>Code:70A03</b>	<b>INTERNSHIP -I</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: Nil</b>	(Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	-	-	-

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. IV Semester</b>		
<b>Code:70B04</b>	<b>PROBABILITY AND STATISTICS (Common for CE, ME, CSE, IT and Min.E)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>2</b>	<b>2</b>	<b>-</b>

**Prerequisite: Nil**

**Course Objectives:**

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: Descriptive Measures & Measures of Dispersion 10 Periods**

Descriptive measures: Measures of central tendency: Arithmetic mean – median – mode – geometric mean – harmonic mean.

Measures of dispersion: Range – Quartile deviation – mean deviation – standard deviation, Measures of skewness, Measures of kurtosis.

**MODULE II: Probability 10 Periods**

Introduction to Probability, events, sample space, mutually exclusive events, Exhaustive events, Addition theorem for 2 & n events and their related problems. Dependent and Independent events, conditional probability, multiplication theorem, Boole's inequality, Baye's Theorem.

**MODULE III: Random Variables and Probability Distributions 10 Periods**

A: Random variables – Discrete Probability distributions. Bernoulli, Binomial, poisson, mean, variance, moment generating function–related problems. Geometric, Negative Binomial distributions (Only mean and Variance).

B: Continuous probability distribution, Normal distribution, mean, variance, moment generating function–related problems. Exponential, Beta and Gamma distributions (Only mean and Variance).

**MODULE IV: Sampling Distributions & Testing of Hypothesis 09 Periods**

Sampling Distributions: Definitions of population-sampling-statistic, parameter. Types of sampling, Expected values of Sample mean and variance, sampling distribution, Standard error, Sampling distribution of means and sampling distribution of variance. Parameter estimations – likelihood estimate, point estimation and interval estimation.

Testing of hypothesis: Null hypothesis, Alternate hypothesis, type I, & type II errors – critical region, confidence interval, and Level of significance. One tailed test, two tailed test.

Large sample tests:

1. Testing of significance for single proportion.
2. Testing of significance for difference of proportion.
3. Testing of significance for single mean.
4. Testing of significance for difference of means.

## **MODULE V: Small Sample Tests**

**09 Periods**

Student t-distribution, its properties; Test of significance difference between sample mean and population mean; difference between means of two small samples, Paired t-test, Snedecor's F- distribution and its properties. Test of equality of two population variances, Chi-square distribution, its properties, Chi-square test of goodness of fit and independence of attributes

### **TEXT BOOKS**

1. Walpole Myers Ye. "**Probability & Statistics for Engineers & Scientists**", Pearson publications, 9<sup>th</sup> edition 2012.
2. Sheldon M. Ross "**Introduction to Probability and Statistics for Engineers and Scientists**", Academic Press, 5<sup>th</sup> edition 2014.

### **REFERENCES**

1. R.K. Jain & S.R.K. Iyengar "**Advanced Engineering Mathematics**" Narosa Publications, 4th edition 2014.
2. Jay L. Devore "**Probability and Statistics for Engineers and Sciences**" Cengage Learning, 8<sup>th</sup> Edition, 2012
3. S C Gupta & V K Kapoor "**Fundamentals of Mathematical statistics**" Sultan Chand, 1<sup>st</sup> edition.

### **E - RESOURCES**

1. <http://www.csie.ntu.edu.tw/~sdlin/download/Probability%20&%20Statistics.pdf>
2. [http://www.stat.pitt.edu/stoffer/tsa4/intro\\_prob.pdf](http://www.stat.pitt.edu/stoffer/tsa4/intro_prob.pdf)
3. <http://users.wfu.edu/cottrell/ecn215/sampling.pdf>
4. <http://www.pnas.org/content/93/9/3772.full.pdf>
5. <http://nsuworks.nova.edu/cgi/viewcontent.cgi?article=2373&context=tqr> (Sampling Theory)
6. <https://sci-hub.cc/10.1111/j.1540-6261.1996.tb05219.x>
7. <http://nptel.ac.in/courses/117105085/>
8. <http://nptel.ac.in/courses/117105085/9>
9. <http://nptel.ac.in/courses/111105041/33>
10. <http://nptel.ac.in/courses/110106064/5>

### **Course Outcomes**

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

1. Understand central tendency and variability for the given data.
2. Find the Probability in certain realistic situation.
3. Identify distribution in certain realistic situation. Also able to differentiate among many random variables Involved in the probability models.
4. Calculate mean and proportions (large sample) and to make Important decisions from few samples which are taken out of unmanageably huge populations.
5. Calculate mean and proportions (small sample) and to make Important decisions from few samples which are taken out of unmanageably huge populations.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. IV Semester</b>		
<b>Code: 70313</b>	<b>MACHINE DRAWING</b> (Common for ME & Min.E)	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Engineering Graphics

**Course Objectives:**

To understand projections of simple machine elements and understand assembly drawings of typical machine parts such as Connecting rod, Eccentric, Cross head, Machine vice, Screw jack, Plummer block, Tail stock and valves.

**Machine Drawing Conventions:**

Need for drawing conventions - introduction to IS conventions

- a) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features
- b) Types of sections - selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
- c) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs, springs.
- d) Title boxes, their size, location and details - common abbreviations & their liberal usage
- e) Assembly drawings - working drawings of machine parts.

**I. Drawing of Machine Elements and simple parts:**

Selection of Views, additional views for the following machine elements and parts with every drawing proportion.

- a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
- b) Keys, cotter joints and knuckle joint.
- c) Riveted joints for plates
- d) Shaft coupling, socket and spigot pipe joint.
- e) Journal, pivot and collar and foot step bearings.

**II. Assembly Drawings:**

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

- a) Engine parts - Stuffing boxes, Cross heads, Eccentrics, Petrol Engine connecting rod, Piston assembly.
- b) Other machine parts - Screws jacks, Machine Vices, Plummer block, Tailstock and Square tool post.
- c) Valves - Steam stop valve, Spring loaded safety valve and Feed check valve.

**Note:** First angle projection is to be adopted. The student should be provided working drawings of actual parts.

## **TEXT BOOKS**

1. K.L.Narayana, P.Kannaiah “**Machine Drawing**”, New Age Publishers, 5<sup>th</sup> edition, 2016.
2. RK Dhawan “**Machine Drawing**”, S.Chand Publications, Revised edition, 2014.
3. N.D.Bhatt “**Machine Drawing**”, Charotar Publishing House pvt ltd, 48<sup>th</sup> edition, 2013.

## **REFERENCES**

1. P.S.Gill “**Machine Drawing**”, S.K. Kataria & Sons Publisher, 17<sup>th</sup> edition, 2009.
2. Rajput “**Machine Drawing**”, Lakshmi Publications
3. K.C.JOHN “**Machine Drawing**”, PHI Learning Pvt Ltd, 2009
4. N.D. Junnarkar “**Machine Drawing**”, Pearson Education India, 2007.

## **E - RESOURCES**

1. <http://nptel.ac.in/courses/105108069/>
2. <http://www.me.metu.edu.tr/courses/me114/Lectures/assembly.htm>
3. <http://www.nature.com/nature/journal/v58/n1510/abs/058543c0.html>

## **Course Outcomes**

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

1. Know the basic conventional representation of materials which is fundamental to the subject.
2. Know the nomenclature of threads, bolts, nuts, set screws and taps.
3. Know the importance of joints like cotter joints, knuckle joint and also come to know how the power being transmitted from one shaft to other.
4. Draw the Journal bearings, collar and foot step bearings.
5. Draw the assembly drawings of machine parts.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. IV Semester</b>		
<b>Code:70314</b>	<b>DYNAMICS OF MACHINES</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>4</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Kinematics of Machines

**Course Objectives:**

The objective of this subject is to understand the static and dynamic behavior of mechanisms under different loading conditions.

**MODULE I: Gyroscopic Motion**

**13 Periods**

Gyroscopic Motion: effect of gyroscopic motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships.

**MODULE II: Static and Dynamic Forces & Synthesis of Linkages**

**13 Periods**

Static and Dynamic Force Analysis of Planar Mechanisms: Introduction - Free Body Diagrams – Conditions for equilibrium – Two, Three and Four Members – Inertia forces and D’Alembert’s Principle – planar rotation about a fixed centre.

Synthesis of Linkages: Three position synthesis – Four position Synthesis – Precision positions – Structural error – Chebychev’s spacing, Freudenstein’s equation, Problems.

**MODULE III: Clutches, Brakes, Dynamometers and Fly Wheels**

**13 Periods**

A: Clutches and Brakes: Friction clutches- Single Disc or plate clutch, Multiple Disc Clutch, Cone Clutch, Centrifugal Clutch.: Simple block brakes, internal expanding brake, band brake of vehicle.  
B: Dynamometers and Fly Wheels: Turning moment – Inertia Torque connecting rod angular velocity and acceleration, crank effort and torque diagrams – Fluctuation of energy – Fly wheels and their design. Dynamometers – absorption and transmission types. General description and methods of operations.

**MODULE IV: Balancing & Vibration**

**13 Periods**

Balancing: Balancing of rotating masses Single and multiple - single and different planes. Balancing of Reciprocating Masses - Primary, Secondary and higher order balancing of reciprocating masses. Analytical and graphical methods. Unbalanced forces and couples of V-engine, multi cylinder in line and radial engines for primary and secondary balancing, locomotive engine balancing.

Vibration: Free Vibration, Forced vibration- mass attached to vertical spring - simple problems on forced damped vibration, Vibration Isolation & Transmissibility Whirling of shafts, critical speeds, torsional vibration, two and three rotor systems.

**MODULE V: Governors**

**12 Periods**

Watt, Porter and Proell governors. Spring loaded governors – Hartnell and Hartung governors with auxiliary springs. Sensitiveness, isochronism and hunting.

## **TEXT BOOKS**

1. Thomas Bevan, “**Theory of Machines**”, CBS Publishers, 3<sup>rd</sup> edition, 2005.
2. Jagadish Lal & J.M.Shah, “**Theory of Machines**”, Metropolitan, 2002.
3. Khurmi, “**Theory of machines**”, S.Chand Publications, 14th edition, 2005

## **REFERENCES**

1. Shiegly “**Theory of Machines**”, MGH Publishers, 5th edition, 1988.
2. JS Rao and RV Dukkanpati, “**Mechanism and Machine Theory**”, New Age International Publishers, 2008.
3. S.S Ratan, “**Theory of Machines**”, Mc. Graw Hill Publishers, 3rd editions, 2009.
4. V.P. Singh, “**Theoty of machines**”, Dhanpat Rai Publishing Company (P) Limited, 2004.

## **E - RESOURCES**

1. [nptel.ac.in/courses/112104114/](http://nptel.ac.in/courses/112104114/)
2. [nptel.ac.in/courses/112101096/](http://nptel.ac.in/courses/112101096/)
3. [nptel.ac.in/syllabus/112104114/](http://nptel.ac.in/syllabus/112104114/)
4. [www.nptelvideos.in/2012/12/dynamics-of-machines.html](http://www.nptelvideos.in/2012/12/dynamics-of-machines.html)
5. [freevideolectures.com](http://freevideolectures.com) › Mechanical › IIT Kanpur
6. <http://www.sciencedirect.com/science/article/pii/S0094114X16306103>.
7. [khitnptelsun.blogspot.com/2012/04/mechanical-engineering.html](http://khitnptelsun.blogspot.com/2012/04/mechanical-engineering.html)

## **Course Outcomes**

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

1. Understand the concept of gyroscopic motion and analyze the effect of precision on different types of vehicles.
2. Draw the free body diagram, and analysis of members which are subjected to different types of forces and synthesis of linkages.
3. Analyse the concept of clutches, brakes, dynamometers and turning moment diagram of flywheels.
4. Know various types balancing masses, forces acting on the rotating & reciprocating masses and also understand the types of vibrations.
5. Understand the concept of governor and analyze various types of governors.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. IV Semester</b>		
<b>Code:70315</b>	<b>PRODUCTION TECHNOLOGY</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objectives:**

The objective of this subject is to provide knowledge of various manufacturing methods of components and various metal joining processes.

**MODULE I: Casting & Methods of Melting 10 Periods**

Casting: Steps involved in making a casting - Advantage of casting and its applications. Patterns and Pattern making - Types of patterns - Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems. Solidification of casting - Concept - Solidification of pure metal and alloys, short & long freezing range alloys. Risers - Types, function and design, casting design considerations, special casting processes- Centrifugal, Die and Investment casting, Mould making machines. Methods of Melting - Crucible melting, cupola operation and steel making process

**MODULE II: Welding & Cutting of Metals 10 Periods**

Welding: Classification of welding process types of welds, welded joints and their characteristics, design of welded joints, Gas welding, Arc welding, Forge welding, resistance welding, Thermit welding.

Cutting of Metals: Oxy-acetylene gas cutting, cutting of ferrous metals. Inert Gas welding - TIG & MIG welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering & Brazing. Heat affected zones, welding defects - causes and remedies, destructive and non - destructive testing.

**MODULE III: Hot and Cold Working Processes & Stamping, Forming 10Periods  
Processes**

A: Hot and cold working processes: Cold working, Hot working, strain hardening, recovery, re - crystallization and grain growth, Comparison of properties of Cold and Hot worked parts, Rolling fundamentals - theory of rolling, types of rolling mills and products. Forces in rolling and power requirements.

B: Stamping, forming processes: Blanking, Piercing, Bending, forming drawing and its types, wire drawing and tube drawing, coining, hot and cold spinning. Types of presses and press tools. Forces and power requirements in the above operations.

**MODULE IV: Extrusion of Metals & Forging Processes 09 Periods**

Extrusion of Metals: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion – Forward and backward extrusion, Impact extrusion, Hydrostatic extrusion.

Forging Processes: Principles of forging, Tools and dies, Types of Forging - Smith forging, Drop Forging and Roll forging, forging hammers, forging defects.



## **MODULE V: Processing of Plastics & Moulding Equipment**

**09 Periods**

Processing of Plastics: Types of Plastics, Properties, applications and their processing methods.

Moulding Equipment: Injection moulding - types of Injection moulding, Blow moulding.

### **TEXT BOOKS**

1. SeropeKalpakjin& Stephen Schmid “**Manufacturing Engineering and Technology**”, Pearson Edu, 7<sup>th</sup> edition, 2014.
2. P.N.Rao, “**Manufacturing Technology**”, Tata McGraw-Hill Publishing Limited, II Edition, 2017.

### **REFERENCES**

1. R.K. Jain “**Production Technology**”, Khanna Publications, 7<sup>th</sup> edition, 2012.
2. R. S Paramar “**Welding Processes and Technology**”, Khanna Publishers, 2013.
3. B.S. Magendran Parashar & R.K. Mittal, “**Elements of Manufacturing Processes**”, Prentice Hall of India, 2004.
4. Rajput R.K, “**A text book of Manufacturing Technology**”, Lakshmi Publications, 2015.
5. Sharma P.C “**A text book on Production Technology**”, S. Chand Publication, 8<sup>th</sup> edition, 2014.

### **E - RESOURCES**

1. <http://me.emu.edu.tr/me364/lecnotes.html>
2. <http://www.nptel.ac.in/courses/112107084/>
3. [https://www.academia.edu/16073401/A\\_Review\\_on\\_Various\\_Welding\\_Techniques](https://www.academia.edu/16073401/A_Review_on_Various_Welding_Techniques)
4. <http://www.nptel.ac.in/courses/112107083/6>
5. <http://nptel.ac.in/courses/112107215/>

### **Course Outcomes**

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

1. Apply different foundry techniques and methods of melting process.
2. Understand metal cutting and joining process.
3. Understand various hot and cold forming presses.
4. Understand various extrusion methods and forging process.
5. Use different types of plastics for specific applications.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. IV Semester</b>		
<b>Code:70316</b>	<b>THERMAL ENGINEERING -I</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:4</b>		<b>4</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Thermodynamics

**Course Objectives:**

The objective of this course is to provide knowledge on working and performance of IC engines, combustion process and compressors.

**MODULE I: Actual Cycles & I.C. Engines** **12 Periods**

Actual Cycles and their Analysis: Introduction, comparison of air standard and actual cycles. time loss factor, heat loss factor, exhaust blow down, loss due to gas exchange process, volumetric efficiency. loss due to rubbing friction, actual and fuel - air cycles of CI Engines.

I.C. Engines: Classification - working principles, valve and port timing diagrams, air standard efficiency, air - fuel and actual cycles - engine systems - fuel, carburetor, fuel injection system, ignition, cooling and lubrication.

**MODULE II: Combustion in S.I. Engines & C.I. Engines** **13 Periods**

Combustion in S.I. Engines : Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Type of Abnormal combustion, pre-ignition and knocking – Fuel requirements and fuel rating, antiknock additives – combustion chamber – requirements, types.

Combustion in C.I. Engines : four stages of combustion – delay period and its importance – effect of engine parameters – diesel knock – need for air movement, suction, compression and combustion induced turbulence – open and divided combustion chambers and nozzles used – fuel requirements and fuel rating.

**MODULE III: I.C. Engine Testing and Performance** **13 Periods**

A: Testing and Performance - I: Terminologies, performance parameters - measurement of cylinder pressure, fuel consumption, air intake, exhaust gas composition, torque, brake power, dynamometer working & types.

B: Testing and Performance - II: Determination of brake power, frictional power, indicated power and mechanical efficiency – volumetric efficiency – MEP – Performance test – Heat balance test - Morse Test.

**MODULE IV: Reciprocating Compressor** **13 Periods**

Introduction– Classification –positive displacement and rotor dynamic machinery – Power producing and power absorbing machines, fan, blower and compressor – positive displacement and dynamic types – reciprocating and rotary types.

Reciprocating Compressor: Principle of operation, work required, Isothermal efficiency volumetric efficiency and effect of clearance, stage compression, under cooling, saving of work, minimum work condition for stage compression.

## **MODULE V: Rotary & Axial Flow Compressors**

**13 Periods**

Rotary Compressors: Roots Blower, vane sealed compressor, Lysholm compressor – mechanical details and principle of working – efficiency considerations. Centrifugal compressors: Mechanical details and principle of operation – velocity and pressure variation. Energy transfer-impeller blade shape - losses, slip factor, power input factor, pressure coefficient and adiabatic coefficient – velocity diagrams – power.

Axial Flow Compressors: Mechanical details and principle of operation – velocity triangles and energy transfer per stage degree of reaction, work done factor - isentropic efficiency - pressure rise calculations – Polytropic efficiency.

### **TEXT BOOKS**

1. V. Ganesan, “**I.C. Engines**”, Tata McGrawHill editions, 4<sup>th</sup> edition, 2012.
2. SM Yahya, “**Turbines, Pumps, Compressors**”, Tata McGrawHill editions, 4<sup>th</sup> edition, 2005.
3. R.K. Rajput, “**Thermal Engineering**”, Lakshmi Publications, 10<sup>th</sup> Edition, 2017

### **REFERENCES**

1. Mathur & Sharma, “**IC Engines**”, Dhanpath Rai & Sons, 4<sup>th</sup> edition, 2010
2. Pulkrabek, “**Engineering fundamentals of IC Engines**”, Pearson PHI, 2<sup>nd</sup> edition, 2004.
3. Rudramoorthy, “**Thermal Engineering**”, TMH Publishers, 3<sup>rd</sup> edition, 2003.
4. B. Yadav, “**Thermodynamics & Heat Engines**”, Central Book Depot., Allahabad, 6<sup>th</sup> edition, 2012.
5. B.Srinivasulu Reddy, “**Thermal Engineering data book**”, JK International Pub, 2014.

### **E - RESOURCES**

1. <https://www.journals.elsevier.com/applied-thermal-eng>
2. [eds.yildiz.edu.tr/journal-of-thermal-engineering](https://www.yildiz.edu.tr/journal-of-thermal-engineering)
3. [https://www.researchgate.net/.../1359-4311\\_Applied\\_Thermodynamics](https://www.researchgate.net/.../1359-4311_Applied_Thermodynamics)
4. [www.nptelvideos.com/mechanical/](https://www.nptelvideos.com/mechanical/)
5. <https://www.btechguru.com/courses--nptel--mechanical>

### **Course Outcomes**

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

1. Understand and differentiate various cycles of internal combustion engines.
2. Understand the working principles and combustion process of CI and SI engines.
3. Analyze the performance of different types of IC engines.
4. Understand and analysis of reciprocating compressors.
5. Understand and analysis of rotary and axial flow compressors.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. IV Semester</b>		
<b>Code:70317</b>	<b>DESIGN OF MACHINE MEMBERS – I</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Mechanics of solids

**Course Objectives:**

The objective of this subject is to provide the design knowledge about machine members like welded joints, bolted joints, shafts, couplings by considering different stresses.

**MODULE I: Introduction & Stresses in Machine Members 10 Periods**

Introduction: General considerations in the design of Engineering Materials and their properties – selection – Manufacturing consideration in design. Tolerance and fits - BIS codes of Steels.  
Stresses in Machine Members: Simple stresses – Introduction to Torsion - Complex stresses – impact stresses – stress strain relation – various theories of failure – factor of safety – design for strength and rigidity – preferred numbers. The concept of stiffness in tension, bending, torsion and combined situations.

**MODULE II: Fatigue Loading 10 Periods**

Fatigue Loading: Stress concentration – Theoretical stress concentration factor – Fatigue stress concentration factor - notch sensitivity – Design for fluctuating stresses – Endurance limit – Estimation of endurance strength – Fatigue theories of failure - Goodman and Soderberg.

**MODULE III: Riveted, Welded & Bolted Joints 10 Periods**

A: Riveted Joints: Modes of failure of riveted joints – Strength equations – efficiency of riveted joints – Design of Boiler joints - eccentrically loaded riveted joints.

B: Welded Joints: Design of Fillet welds – axial loads – circular fillet welds – bending and torsion - eccentrically loaded joints.

Bolted Joints: Design of bolts with pre – stresses - Design of joints under eccentric loading - bolt of uniform strength, Cylinder cover joints.

**MODULE IV: Design of Shafts, Shaft Coupling & Axially Loaded Joints 09 Periods**

Design of Shafts: Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads – Shaft sizes – BIS code – Design of shaft for a gear and belt drives.

Shaft Coupling: Rigid couplings – Muff, Split muff and Flange couplings. Flexible couplings – Pin - Bush coupling.

Axially Loaded Joints: Keys, Cotters and Knuckle Joints: Design of Keys - stresses in keys - cotter joints - spigot and socket, sleeve and cotter, jib and cotter joints - Knuckle joints.

**MODULE V: Mechanical Springs 09 Periods**

Mechanical Springs: Stresses and deflections of helical springs - Extension -compression springs - Springs for static and fatigue loading- natural frequency of helical springs - Energy storage capacity - helical torsion springs - Co-axial springs.

## **TEXT BOOKS**

1. Shigley, “**Mechanical Engineering Design**”, McGraw-Hill, 10<sup>th</sup> edition, 2014.
2. Pandya& shah, “**Machine design**”,Charotar Publishers, 19<sup>th</sup> edition, 2014.

## **REFERENCES**

1. V.M. Faires, “**Design of Machine Elements**”, C.B.S. Publishers & Distributors, The Macmillan company, 4<sup>th</sup> edition, 1965.
2. Allen S. Hall, “**Machine design**”, Schaum Series, McGraw hill, 1966.
3. S MD Jalaludin, “**Machine Design**”, Anuradha Publishers Chennai.3<sup>rd</sup> edition, 2004.
4. Data Books: (i) P.S.G. College of Technology (ii) Mahadevan, CBS publisher, 4<sup>th</sup> edition, 2013.
5. V.B. Bhandari, “**Design of Machine Elements**”, 4<sup>th</sup> edition, McGraw-Hill, 2016.

## **E - RESOURCES**

1. [nptel.ac.in/courses/IIT...I/...connections/3\\_welded\\_and\\_welding\\_connections.pdf](http://nptel.ac.in/courses/IIT...I/...connections/3_welded_and_welding_connections.pdf)
2. [nptel.ac.in/courses/112106137/pdf/1\\_1.pdf](http://nptel.ac.in/courses/112106137/pdf/1_1.pdf)
3. [web.itu.edu.tr/~halit/Makel/Ch\\_10\\_slides\\_m.pdf](http://web.itu.edu.tr/~halit/Makel/Ch_10_slides_m.pdf)
4. [research.ijcaonline.org/efitra/number2/efitra1014.pdf](http://research.ijcaonline.org/efitra/number2/efitra1014.pdf)
5. [www.technicaljournalsonline.com/ijaers/VOL%20III/.../395.pdf](http://www.technicaljournalsonline.com/ijaers/VOL%20III/.../395.pdf)
6. [nptel.ac.in/courses/112105124/34](http://nptel.ac.in/courses/112105124/34)

## **Course Outcomes**

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

1. Understand various modes of failures and stresses for machine components.
2. Understand different factors for fracture mechanics.
3. Understand and analysis of different types of joints for engineering problems.
4. Analyze different types of rotary machine components.
5. Analyze different types springs.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. IV Semester</b>		
<b>Code: 70318</b>	<b>KINEMATICS AND DYNAMICS LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		<b>-</b>	<b>-</b>	<b>4</b>

### **Course Objectives:**

The objective of the lab is to practice the elements in kinematics and dynamics such as linkages, gears, cams and provide the basic knowledge to design such elements.

### **List of Experiments**

**Note:** Any 12 experiments need to be performed

1. Characteristics study of Cam Profile.
2. Determination of Critical Speed.
3. Determination of Gyroscopic Couple.
4. Determination of Natural Frequency of spring and mass system.
5. Determination of Natural Frequency of free transverse system.
6. Determination of Radius of Gyration and Moment of Inertia of compound pendulum.
7. Determination of Radius of Gyration and Moment of Inertia of bifilar system.
8. Characteristics study of Balancing of Rotating Masses-static condition.
9. Characteristics study of Balancing of Rotating Masses-dynamic condition.
10. Determination of Speed Ratio of Epi-cyclic Gear Train.
11. Study of various types of Kinematic links, pairs, chains and Mechanisms.
12. Study of various types of gear trains – simple, compound, reverted, epicyclic and differential.
13. Characteristics study of Governor apparatus with differential attachments.
14. Study of various type of cam and follower arrangements.

### **Course Outcomes**

At the end of the course students will be able to

1. Understand types of motion in cam profile.
2. Analyze forces and torques for components in linkages.
3. Understand static and dynamic balancing.
4. Understand forward and inverse kinematics for open-loop mechanisms.
5. Identify, formulate and solve engineering problems in gear trains.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. IV Semester</b>		
<b>Code:70319</b>	<b>PRODUCTION TECHNOLOGY LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:2</b>		<b>-</b>	<b>-</b>	<b>4</b>

### **Course Objectives:**

Student will be able to learn and practice the various production processes like casting, melting, welding, forming and processing of plastics.

### **List of Exercises**

#### **I. Metal Casting Lab:**

1. Pattern making - for one casting drawing.
2. Sand properties testing - Exercise -for strength and permeability.
3. Mould making.
4. Melting and Casting – demonstration.

#### **II. Welding Lab:**

1. Arc Welding.
2. Spot Welding.
3. TIG Welding.
4. Gas Welding.
5. Plasma Welding.

#### **III. Mechanical Press Working:**

1. Blanking & Piercing operations and study of simple, compound and progressive press tools.
2. Hydraulic Press: Deep drawing.
3. Bending and other operations.

#### **IV. Processing Of Plastics:**

1. Injection Moulding.
2. Blow Moulding.

### **Course Outcomes**

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

1. Prepare the pattern by using wood turning lathe.
2. Test the various properties of sand like strength and permeability.
3. Create the mould and make the required part by using casting process.
4. Prepare various joints like lap joint, T-joint and butt joint by using Arc welding, spot welding, TIG welding, gas welding and Plasma welding
5. Make various press working operations like bending, blanking and piercing and prepare various plastic articles by injection moulding and blow moulding process.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. IV Semester</b>		
<b>Code:70M02</b>	<b>GENDER SENSITIZATION</b> (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: Nil</b>		-	-	<b>3</b>

**Prerequisite: Nil**

**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**

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**

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**

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**

Sexual Harassment: Say No. 1 (*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**

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 Bhugubanda, 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 BOOK**

1. Towards a World of Equals: A bilingual Textbook on Gender, A Suneetha – etal.

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

### **E - RESOURCES**

1. [http://www.actforyouth.net/resources/rf/rf\\_gender1\\_1213.cfm](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>(ISSUESOF 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.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. IV Semester</b>		
<b>Code: 70A02</b>	<b>LAW FOR ENGINEERS</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: NIL</b>	(Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	-	2	-

**Prerequisites: NIL**

**Course Objective:**

The objective of the course is to familiarize students (Prospective engineers) with elementary knowledge of laws that would be of utility in their profession.

**MODULE I: Indian Legal System**

**8 Periods**

Introduction to Indian legal system: Constitution of India, sources of law and judicial system.

Contracts and its elements: Contract interpretation, Employment contracts, service contracts, contract of indemnity, employment agreements.

**MODULE II: Labour Laws**

**6 Periods**

Introduction to Labour Laws: Provident fund, ESI, Maternity Benefit (amendments of 2016).

Bonus, Gratuity and welfare measures.

**MODULE III: Taxation**

**6 Periods**

A: Introduction to Taxation: Income tax act, TDS.

B: Goods and Services Tax (GST).

**MODULE IV: IT Act and RTI Act**

**6 Periods**

Information Technology (IT) Act 2000 and cyber laws.

Right to Information Act-2005: Evolution and concept; Practice and procedures.

**MODULE V: Intellectual Property Rights**

**6 Periods**

Intellectual Property Rights: Overview, main forms of IP.

Copyright, Trademarks and Patents with reference to software, circuits, structures and designs.

**TEXT BOOKS:**

1. S.K. Kapur - **Human Rights under International Law and Indian Law** - Central Law Agency – 2001.

**REFERENCES:**

1. H.M. Seervai, “**Constitutional Law of India**”, Tripathi Publications, 4<sup>th</sup> Edition, 1991.
2. Cornish W. R., “**Intellectual Property Rights, Patents**”, Trademarks, Copyrights & Allied Rights - Sweet & Maxwell, 2008.
3. Avtarsingh, “**Company Law**”, Eastern Book Co., 2007.
4. James Graham, “**Cyber Security Essentials**”, CRC Press - 1<sup>st</sup> Ed., 2011.
5. Maskus, Keith E. **Intellectual property rights in the global economy** Institute for International 2000.

**E-RESOURCES:**

1. <https://www.youtube.com/watch?v=YBjyU7ciHpU>
2. <http://nptel.ac.in/courses/109103024/40>
3. <http://nptel.ac.in/courses/122105020/12>
4. <http://nptel.ac.in/courses/122105020/17>

**Course Outcomes:**

After the completion of this course, the student will able to:

1. Understand basic concepts of Indian legal system and also the elements of various contracts.
2. Understand the basic concepts of various Labour laws.
3. Gain the basic knowledge of taxation and its procedures.
4. Understand the concept of cyber laws and the legal procedures under IT Act-2000. Also gain the knowledge on Right to Information Act-2005.
5. Gain the knowledge of various Intellectual properties and the legal and policy considerations of Intellectual Property Rights.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code:70H04</b>	<b>ENGINEERING ECONOMICS AND ACCOUNTANCY</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:2</b>		<b>2</b>	<b>-</b>	<b>-</b>

**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 8 Periods**

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).

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 6 Periods**

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

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 6 Periods**

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 6 Periods**

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

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**

**6 Periods**

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).

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, 2<sup>nd</sup> edition, 2005.
2. Varshney & Maheswari, “**Managerial Economics**”, 5<sup>th</sup> 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**”, 4<sup>TH</sup> edition Scitech.
4. S.N.Maheswari & S.K. Maheswari, “**Financial Accounting**”, 6<sup>th</sup> edition Vikas.
5. Dwivedi, “**Managerial Economics**”, Vikas, 6th Edition.

### **E RESOURCES:**

1. <http://www.learnerstv.com/Free-Economics-video-lecture-courses.htm>
2. <http://www.onlinevideolecture.com/?course=mba-programs&subject=microeconomics>
3. <http://www.learnerstv.com/Free-Management-Video-lectures-ltv034-Page1.htm>
4. <http://www.learnerstv.com/Free-Management-Video-lectures-ltv637-Page1.htm>
5. <http://www.onlinevideolecture.com/?course=mba-programs&subject>
6. <http://nptel.ac.in/courses/110105067/>
7. <http://nptel.ac.in/courses/110107073/>
8. <http://nptel.ac.in/courses/110101005/>
9. <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.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code: 70238</b>	<b>ELECTRICAL DRIVES AND MICRO PROCESSORS</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** NIL

**Course Objectives:**

This course introduces the basic concepts of DC, AC drives and requirements of electrical drives. The emphasis of this course is laid on the 8085 microprocessor and its applications.

**MODULE I: DC and AC Motors 10 Periods**

DC motors: Construction and working principle of DC motor. Shunt, series and compound motors.

AC motors: Construction and working principle of single phase and three phase induction motors. Mechanical characteristics, speed-torque characteristics of various types of load and drive motor, braking of electrical motors.

**MODULE II: Starting Methods & Speed Control of DC and AC Motors 10 Periods**

Starting Methods: Types of D.C Motor starters, typical control circuits for shunt and series motors, three phase squirrel cage and slip ring induction motors.

Speed Control: Speed control of DC series and shunt motors, armature and field control, Ward-Leonard control system, applications. Speed control of three phase induction motor, voltage control, voltage / frequency control, slip power recovery scheme, applications.

**MODULE III: Requirements of Electrical Drives 10 Periods**

A: Basic Elements, types of electric drives, factors influencing the choice of electrical drives, heating and cooling curves.

B: Loading conditions and classes of duty, selection of power rating for drive motors with regard to thermal overloading and load variation factors.

**MODULE IV: 8085 Microprocessor 9 Periods**

Block diagram of microcomputer, architecture of 8085, pin configuration, instruction set. Addressing modes, simple programs using arithmetic and logical operations.

**MODULE V: Interfacing and Applications of Microprocessor 9 Periods**

Basic interfacing concepts, interfacing of input and output devices, applications of microprocessor, temperature control, stepper motor control, traffic light control.

**TEXT BOOKS**

1. I.J.Nagrath & D.P.Kothari, “**Electric Machines**” ,Tata Mc Graw Hill, 4<sup>th</sup> Edition, 2010.
2. Ramesh Goankar, “**Microprocessor Architecture, Programming and Applications with 8085**”, Penram International Publishing, 6<sup>th</sup> Edition, 2013.

## **REFERENCES**

1. Vedam Subrahmaniam, “**Electric Drives Concepts and Applications**”, Tata McGraw
2. Milman and Halkias, “**Integrated Electronics**”, Tata McGraw-Hill publishers, 1995.
3. P.S. Bimbira, “**Electrical Machinery**”, Khanna Publishers, New Delhi, 7<sup>th</sup> Edition, 2011.
4. S.K.Bhattacharya, “**Electrical Machines**”, Tata McGraw Hill, New Delhi, 4<sup>th</sup> Edition, 2014.
5. G.K. Dubey, “**Fundamentals of Electric Drives**”, Narosa Publications, 5<sup>th</sup> Edition, Reprint, 2005.

## **E - RESOURCES**

1. <https://www.electrical4u.com/electrical-drives/>
2. [http://nptel.ac.in/courses/106108100/pdf/Lecture\\_Notes/LNm1.pdf](http://nptel.ac.in/courses/106108100/pdf/Lecture_Notes/LNm1.pdf)
3. <http://nptel.ac.in/courses/108108077/>

## **Course Outcomes**

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

1. Understand the basic requirements of electric drives.
2. Comprehend the construction, operation and characteristics of DC and AC drives.
3. Understand the various starting methods and speed control techniques of DC and AC drives.
4. Analyze the architecture and various addressing modes of 8085 microprocessor.
5. Emphasize the various applications of 8085 microprocessor.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code: 70320</b>	<b>THERMAL ENGINEERING - II</b> <i>(Use of standard Steam Tables is permitted)</i>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>2</b>	<b>2</b>	<b>-</b>

**Prerequisites:** Thermal Engineering - I

**Course Objectives:**

The objective of this subject is to provide knowledge about different cycle used in power plants, combustion of fuels and to provide knowledge about boilers, Steam Turbines, Steam Condensers & Steam Nozzles, Gas Turbines, Jet Propulsion & Rockets and their principle of operations.

**MODULE I: Basic Concepts**

**10 Periods**

Basic Concepts: Rankine cycle - Schematic layout, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance – Regeneration & reheating.

Combustion: Fuels and combustion, concepts of heat of reaction, adiabatic flame temperature, stoichiometry and flue gas analysis.

**MODULE II: Boilers**

**10 Periods**

Boilers : Classification – Working principles – with sketches including H.P. boilers – Mountings and Accessories – Working principles, Boiler horse power, equivalent evaporation, efficiency and heat balance – Draught, classification – Height of chimney for given draught and discharge, condition for maximum discharge, efficiency of chimney – artificial draught, induced and forced draught.

**MODULE III: Steam Condensers & Steam Nozzles**

**10 Periods**

A: Steam Condensers: Requirements of steam condensing plant – Classification of condensers – working principle of different types of condensers vacuum efficiency and condenser efficiency – air leakage, sources and its effects, air pump- cooling water requirement.

B: Steam Nozzles: Function of nozzle – applications - types, Flow through nozzles, thermodynamic analysis – assumptions -velocity of nozzle at exit-Ideal and actual expansion in nozzle, velocity coefficient, condition for maximum discharge, critical pressure ratio, criteria to decide nozzle shape: Super saturated flow, its effects, degree of super saturation and degree of under cooling - Wilson line.

**MODULE IV: Steam Turbines & Reaction Turbine**

**09 Periods**

Steam Turbines: Classification – Impulse turbine; Mechanical details – Velocity diagram – effect of friction – power developed, axial thrust, blade or diagram efficiency – condition for maximum efficiency. De-Laval Turbine - its features. Methods to reduce rotor speed-Velocity compounding and pressure compounding, Velocity and Pressure variation along the flow – combined velocity diagram for a velocity compounded impulse turbine.

Reaction Turbine: Mechanical details – principle of operation, thermodynamic analysis of a stage, degree of reaction –velocity diagram – Parson’s reaction turbine – condition for maximum efficiency.

## **MODULE V: Gas Turbines, Jet Propulsion & Rockets**

**09 Periods**

Gas Turbines: Simple gas turbine plant – Ideal cycle, essential components – parameters of performance – actual cycle – regeneration, inter cooling and reheating – Closed and Semi-closed cycles – merits and demerits, Brief concepts about compressors, combustion chambers and turbines of Gas Turbine Plant.

Jet Propulsion: Principle of Operation – Classification of jet propulsive engines – Working Principles with schematic diagrams and representation on T-S diagram - Thrust, Thrust Power and Propulsion Efficiency – Turbo jet engines – Needs and Demands met by Turbo jet – Schematic Diagram, Thermodynamic Cycle, Performance Evaluation Thrust Augmentation – Methods.

Rockets: Application – Working Principle – Classification – Propellant Type – Thrust, Propulsive Efficiency – Specific Impulse – Solid and Liquid propellant Rocket Engines.

### **TEXT BOOKS**

1. R.K. Rajput, “**Thermal Engineering**”, Lakshmi Publications, 10<sup>th</sup> edition, 2017.
2. V.Ganesan “**Gas Turbines**”, TMH Publishers, 3<sup>rd</sup> edition, 2010.

### **REFERENCES**

1. R. Yadav “**Thermodynamics and Heat Engines**”, Central Book Depot, 7<sup>th</sup> edition, 2007.
2. P.Khajuria & S.P.Dubey “**Gas Turbines and Propulsive Systems**”, Dhanpatrai Publications, 2012.
3. Cohen, Rogers and Saravana Muttoo, Addison Wesley – Longman “**Gas Turbines**”, Pearson publishers, 5<sup>th</sup> edition, 2001.
4. P.L.Bellaney “**Thermal Engineering**”, khanna publishers. 5<sup>th</sup> edition, 2010.
5. M.L.Marthur & Mehta “**Thermal Engineering**”, Jain bros Publishers, 3<sup>rd</sup> edition, 2014.

### **E - RESOURCES**

1. <http://nptel.ac.in/courses/112106133/>
2. <https://www.journals.elsevier.com/applied-thermal-engineering>
3. <http://www.personal.utulsa.edu/~kenneth-weston/chapter5.pdf>
4. <https://www.irjet.net/archives/V2/i5/IRJET-V2I5185.pdf>
5. <http://nptel.ac.in/courses/114105029/>
6. <http://nptel.ac.in/courses/108105058/>

### **Course Outcomes**

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

1. Understand different cycles used in power plant.
2. Understand working principles of boiler and its accessories.
3. Analyse the performance of steam nozzle and condenser.
4. Analyse the performance of steam and reaction turbine.
5. Analyse the performance of gas turbines and jet propulsions.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code:70321</b>	<b>DESIGN OF MACHINE MEMBERS – II</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>2</b>	<b>2</b>	<b>-</b>

**Prerequisites:** Design of Machine Members-I

**Course Objectives:**

The objective of this subject is to provide analytical knowledge of designing bearings, engine components, machine members and power transmissions systems.

**MODULE I: Bearings**

**10 Periods**

Sliding Contact Bearings: Types of Journal bearings – Basic modes of Lubrication – Bearing construction –bearing design –bearing materials – Selection of Lubricants.

Rolling Contact Bearings: Types of Rolling Contact bearings – Selection of bearing type – Selection of Bearing life – Design for cyclic loads and speeds – Static and Dynamic loading of ball & roller bearings.

**MODULE II: Design of IC Engine Parts**

**10 Periods**

Connecting Rod: Thrust in connecting rod – stress due to whipping action on connecting rod ends –Crank Shaft: Cranks and Crank shafts, strength and proportions of over hung and center cranks – Crank pins, Crank shafts. Piston: Pistons, forces acting on piston construction design and proportions of piston. Cylinder: Cylinder, cylinder liners.

**MODULE III: Power Transmissions Systems- Belts, Ropes, Pulleys & Chains**

**10 Periods**

A: Belts: Transmission of power by Belt and Rope drives, Transmission efficiencies. Belts – Flat and V types.

B: Ropes, Pulleys & Chains: Rope pulleys for belt and rope drives, Materials, Chain drives.

**MODULE IV: Gear Drives – Spur, Helical and Bevel Gear Drives**

**09 Periods**

Spur Gear Drives: Spur gears- gear terminology –tooth profiles-Load concentration factor – Dynamic load factor. Surface compressive strength – Bending strength – Design analysis of spur gears – Estimation of centre distance, Module and face width, check for plastic deformation. Check for dynamic and wear considerations.

Helical and Bevel Gear Drives: Introduction of Helical and Bevel gears – Load concentration factor – Dynamic load factor. Surface compressive strength – Bending strength – Design analysis of Helical and Bevel gears – Estimation of centre distance, Module and face width, check for plastic deformation. Check for dynamic and wear considerations.

**MODULE V: Design of Worm Gears & Power Screws**

**09 Periods**

Design of Worm Gears: Worm gears – Properties of Worm gears – Selection of materials – Strength and wear rating of worm gears – Force analysis – Friction in worm gears – thermal considerations.

Design of Power Screws: Design of screw, Square ACME, Buttress screws, design of nut, compound screw, differential screw, ball screw- possible failures.

## **TEXT BOOKS**

1. V.B. Bhandari “**Machine Design**”, Tata McGraw-Hill Education, 1994.
2. R S khurmi & J S Gupta “**Machine Design**”, S Chand Publishers, 25<sup>th</sup> edition 2005.

## **REFERENCES**

1. R.N. Norton “**Machine Design**”, Penton IPC, 2000.
2. Kannaiah “**Machine Design**”, Sciotech Publishers, 2010 .
3. S MD Jalaludin “**Machine Design**”, Anuradha Publishers
4. JE Shigley “**Mech. Engg. Design**”, Tata McGraw-Hill Education, 6th edition, 2001
5. Data Books: (I) P.S.G. College of Technology (ii) Mahadevan, CBS publishers, 4<sup>th</sup> edition 2013.

## **E - RESOURCES**

1. [www.globalspec.com](http://www.globalspec.com) > ... > POWER TRANSMISSION > GEARS
2. [nptel.ac.in/courses/112106137/pdf/2\\_15.pdf](http://nptel.ac.in/courses/112106137/pdf/2_15.pdf)
3. [nptel.ac.in/courses/112106137/pdf/5\\_1.pdf](http://nptel.ac.in/courses/112106137/pdf/5_1.pdf)
4. [mechanicaldesign.asmedigitalcollection.asme.org/article.aspx?articleid=1452606](http://mechanicaldesign.asmedigitalcollection.asme.org/article.aspx?articleid=1452606)
5. <https://www.youtube.com/watch?v=ePVReO5pRvU>
6. <https://www.youtube.com/watch?v=8bml2pK6Ra0>

## **Course Outcomes**

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

1. Gain knowledge of various types of bearings.
2. Design and analyze the performance of IC engine parts.
3. Design power transmission system for various practical applications
4. Analyse design performance of spur gear drives, helical and bevel gear drives.
5. Analyse design performance of worm gears.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code:70335</b>	<b>GAS DYNAMICS AND JET PROPULSION</b> <i>(Use of Standard Gas Tables is permitted)</i>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>	<b>(Professional Elective – I)</b>	<b>3</b>	<b>2</b>	<b>-</b>

**Prerequisites:** Thermodynamics

**Course Objectives:**

The objective of the course is to understand the fundamental principles, normal and oblique shocks of compressible flow and to apply in the Jet and Space Propulsion systems.

**MODULE I: Basic Concepts and Isentropic Flows** **12 Periods**

Energy and momentum equations of compressible fluid flows - Stagnation states, Mach waves – regions of flow-Mach cone and Mach angle-Crocco number – characteristic Mach number-Effect of Mach number on compressibility - Isentropic flow through variable ducts – mass flow through ducts- Nozzle and Diffusers.

**MODULE II: Flow Through Ducts** **12 Periods**

Flows through constant area ducts with heat transfer (Rayleigh flow)- variation in flow properties – maximum heat transfer. Flow with friction (Fanno flow) – friction factor- variation of flow properties-Isothermal flow.

**MODULE III: Normal and Oblique Shocks** **12 Periods**

A: Normal Shocks: Governing equations - Variation of flow properties across shocks - Static pressure ratio equation, Prandtl - Meyer relations –temperature ratio-Rankine - Hugniot equation-strength of shock-change in entropy-effect of friction.

B: Oblique Shocks: Oblique shock waves- variation of flow parameters – Oblique shock relations from normal shock- Mach waves- properties and Mach number after shock- applications- use of charts.

**MODULE IV: Jet Propulsion** **14 Periods**

Theory of jet propulsion - Thrust equation - Thrust power and propulsive efficiency - Operating principle, cycle analysis and use of stagnation state performance of ram jet, turbojet, turbofan and turbo prop engines.

**MODULE V: Space Propulsion** **14 Periods**

Types of rocket engines - Propellants-feeding systems - Ignition and combustion - Theory of rocket propulsion - Performance study - Staging - Terminal and characteristic velocity - Applications - space flights.

**TEXT BOOKS**

1. Anderson, J.D., "**Modern Compressible flow**", 3<sup>rd</sup> Edition, McGraw Hill, 2003.
2. Yahya, S.M. "**Fundamentals of Compressible Flow**", 4<sup>th</sup> Edition, New Age International (P) Limited, New Delhi, 2009.

## REFERENCES

1. Hill. P. and C. Peterson, "**Mechanics and Thermodynamics of Propulsion**", Addison - Wesley Publishing company, 1992.
2. Zucrow. N.J., "**Aircraft and Missile Propulsion**", Vol.1 & II, John Wiley, 1975.
3. Zucrow. N.J., "**Principles of Jet Propulsion and Gas Turbines**", John Wiley, New York,
4. Sutton. G.P., "**Rocket Propulsion Elements**", John wiley, New York, 1986.
5. Shapiro. A.H., "**Dynamics and Thermodynamics of Compressible fluid Flow**", John wiley, New York, 1953.

## E - RESOURCES

1. [web.iitd.ac.in/~pmvs/courses/me17152008/notes-new.pdf](http://web.iitd.ac.in/~pmvs/courses/me17152008/notes-new.pdf)
2. <https://mycourses.aalto.fi/pluginfile.php/.../GasDynamics-Lecture-AllSlides.pdf>
3. <https://www.ncbi.nlm.nih.gov/labs/articles>
4. [www.sciencedirect.com/science](http://www.sciencedirect.com/science)
5. [nptel.ac.in/courses/112103021/](http://nptel.ac.in/courses/112103021/)
6. [nptel.ac.in/courses/112106166/](http://nptel.ac.in/courses/112106166/)

## Course Outcomes

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

1. Understand the basic difference between incompressible and compressible flow.
2. Understand and apply the principles of compressible flow in the constant area ducts with friction and heat transfer.
3. Understand the phenomenon of shock normal and oblique waves and its effect on flow.
4. Gain basic knowledge about jet propulsion and Jet Propulsion systems.
5. Gain basic knowledge about jet propulsion and Rocket Propulsion systems.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code:70336</b>	<b>MECHANICS OF COMPOSITE MATERIALS (Professional Elective – I)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>3</b>	<b>2</b>	<b>-</b>

**Prerequisites:** Mechanics of Solids, Metallurgy and Material Science.

**Course Objectives:**

The objective of the subject is to provide the basic knowledge of manufacturing, characteristics of composite materials.

**MODULE I: Basic Concepts and Characteristics, Reinforcements 12 Periods**

Basic concepts and characteristics: Geometric and Physical definitions, natural and man-made composites, Aerospace and structural applications, types and classification of composites.

Reinforcements: Fibers- Glass, Silica, Kevlar, carbon, boron, silicon carbide, and boron carbide fibers. Particulate composites, Polymer composites, Thermoplastics, Thermosetting plastics, metal matrix and ceramic composites.

**MODULE II: Micromechanics 12 Periods**

Unidirectional composites, constituent materials and properties, elastic properties of a lamina, properties of typical composite materials, laminate characteristics and configurations. Characterization of composite properties.

**MODULE III: Coordinate Transformations and Manufacturing Methods 12 Periods**

A: Coordinate transformations: Hooke's law for different types of materials, Hooke's law for two dimensional unidirectional lamina, transformation of stress and strain, Numerical examples of stress strain transformation, Graphic interpretation of stress – strain relations. Off - axis, stiffness modulus, off - axis compliance.

B: Manufacturing Methods: Autoclave, tape production, moulding methods, filament winding, man layup, pultrusion, RTM.

**MODULE IV: Unidirectional Composites 14 Periods**

Elastic behavior of unidirectional composites: Elastic constants of lamina, relationship between engineering constants and reduced stiffness and compliances, analysis of laminated composites, constitutive relations.

Strength of unidirectional lamina: Micro mechanics of failure, Failure mechanisms, Strength of an orthotropic lamina, Strength of a lamina under tension and shear maximum stress and strain criteria, application to design. The failure envelope, first failure, free-edge effects. Micro mechanical predictions of elastic constants.

**MODULE V: Elastic behavior of laminates 14 Periods**

**Elastic behavior of laminates:** Basic Assumptions, Strain –Displacement relations, Stress-Strain relations, laminate stiffness, laminate compliance, symmetric laminates, Orthotropic Laminates, laminate engineering properties, computational procedure for determination of elastic properties.

## **TEXT BOOKS**

1. Autar .K.Law, “**Mechanics of Composite materials**”, 2<sup>nd</sup> edition, 2006.
2. Krishan.K.Chawla,”Composite materials-Science and Engineering”, Springer publishers, 3<sup>rd</sup> edition, 2012
3. Isaac and M.Daniel, “**Engineering Mechanics of Composite Materials**”, Oxford University Press. Vol. 13, 2006.

## **REFERENCES**

1. B. D. Agarwal and L. J. Broutman, “**Analysis and performance of fiber Composites**”, Wiley-Interscience, 2006.
2. Robert M.Jones, “**Mechanics of Composite Materials**”, Taylor & Francis group, 2<sup>nd</sup> edition, 2015.
3. Mudhujit.Mukhopadyay, “**Mechanics of composite materials and Strucutres**”, Universities press, 2004.
4. V.V.Vasiliev and E.Morozov, “**Advanced mechanics of composite materials and structural elements**”, Newnes, 2013.

## **E - RESOURCES**

1. [nptel.ac.in/courses/112104168/L01.pdf](http://nptel.ac.in/courses/112104168/L01.pdf)
2. [www.springer.com/materials](http://www.springer.com/materials).
3. [nptel.ac.in/.../112104168](http://nptel.ac.in/.../112104168)

## **Course Outcomes**

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

1. Understand the basic characteristics of reinforcement of composite.
2. Analyse the properties of micro mechanics of composites.
3. Understand the coordinate transformation and manufacturing methods.
4. Analyse the elastic behavior of unidirectional composites for various applications.
5. Understand elastic behavior of laminates.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code:70337</b>	<b>APPLIED HYDRAULICS AND PNEUMATICS (Professional Elective – I)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>3</b>	<b>2</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objectives:**

This course will give an appreciation of the fundamental principles, design and operation of hydraulic and pneumatic machines, components and systems and their application in recent automation revolution.

**MODULE I: Fluid Power Principles and Fundamentals** **12 Periods**

Introduction to Fluid power- Advantages and Applications- Fluid power systems – Types of fluids- Properties of fluids Basics of Hydraulics – Pascal’s Law- Principles of flow – Work, Power and Torque. Properties of air– Perfect Gas Laws.

**MODULE II: Hydraulic System and Components** **12 Periods**

Sources of Hydraulic power: Pumping Theory – Pump Classification- Construction, Working, Design, Advantages, Disadvantages, Performance, Selection criterion of Linear, Rotary- Fixed and Variable displacement pumps, Hydraulic Actuators: Cylinders – Types and construction, Hydraulic motors Control Components: Direction control, Flow control and Pressure control valves- Types, Construction and Operation- Applications – Types of actuation. Accessories: Reservoirs, Accumulators, Intensifiers, Pressure Switches- Applications- Fluid Power ANSI Symbol.

**MODULE III: Hydraulic Circuits** **12 Periods**

A: Industrial hydraulic circuits- Regenerative, Pump Unloading, Double-pump, Pressure Intensifier, Air over oil, Sequence, Reciprocation, Synchronization, Fail-safe.

B: Speed control, Hydrostatic transmission, Accumulators, Electro hydraulic circuits, Mechanical Hydraulic servo systems.

**MODULE IV: Pneumatic System** **14 Periods**

Compressors- Filter, Regulator, Lubricator, Muffler, Air control Valves, Quick Exhaust valves, Pneumatic actuators, Servo systems. Introduction to Fluidics, Pneumatic logic circuits.

**MODULE V: Design of Hydraulic and Pneumatic Circuits** **14 Periods**

Design of circuits using the components of hydraulic system for Drilling, Planning, Shaping, Punching, Press – Selection, fault finding and maintenance of hydraulic components- Sequential circuit design for simple application using cascade method, Electro pneumatic circuits. Selection criteria of pneumatic components – Installation fault finding and maintenance of pneumatic components. Microprocessor and PLC- Applications in Hydraulic and Pneumatics - Low cost Automation – Hydraulic and Pneumatic power packs.

## **TEXT BOOKS**

1. Srinivasan. R, "**Hydraulic and Pneumatic Control**", IInd Edition, Tata McGraw - Hill Education, 2012.
2. Anthony Esposito," **Fluid Power with Applications**", PHI / Pearson Education, 2005.

## **REFERENCES**

1. Shanmugasundaram.K, "**Hydraulic and Pneumatic controls**", Chand & Co, 2006.
2. Majumdar, S.R., "**Oil Hydraulics Systems- Principles and Maintenance**", Tata McGraw Hill, 2001
3. Micheal J, Pinches and Ashby, J.G., "**Power Hydraulics**", Prentice Hall, 1989.
4. Dudelyt, A Pease and John J Pippenger, "**Basic Fluid Power**", Prentice Hall, 1987.
5. Majumdar, S.R., "**Pneumatic Systems – Principles and Maintenance**", Tata McGraw Hill, 2007. .

## **E - RESOURCES**

1. <http://fluidpowerjournal.com/>
2. <http://www.worldcat.org/title/applied-hydraulics-pneumatics/oclc/2007920>
3. <http://www.nptelvideos.com/video.php?id=761>
4. <http://www.nptelvideos.in/2012/11/hydraulics.html>

## **Course Outcomes**

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

1. Understand the fundamentals of fluids and fluid power systems.
2. Understand functioning and applications of various hydraulic system components.
3. Understand the different types and applications of hydraulic servo circuits.
4. Understand functioning and applications of various pneumatic system components.
5. Design PLC based hydraulic and pneumatic circuits for low cost automation.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code: 70H03</b>	<b>ENGLISH COMMUNICATION AND PRESENTATION SKILLS LAB</b> (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1</b>		-	-	<b>2</b>

**Prerequisites:** Nil

**Course Objective:**

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.

**Introduction:** Effective Communication binds any progressive organization. At the B.Tech. third year level, the Technical Communication and Presentation skills laboratory is introduced to help students succeed in attaining a challenging and a professional career. Each unit aims to reinforce learning and helps the learners perform well before and after they enter the world of work. The course is designed to be practical, stimulating and challenging providing opportunities to the learners to go beyond the classrooms and get empowered in Technical Communication skills. The course enables the students understand the employers' expectations that are varied from company to company while giving them insight into the acceptable norms of attitude, behavior and etiquette. The course also focuses on the presentation skills of the learners.

**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 Presentation**

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 Email 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.

\*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.

### **MODULE V: Job Hunt Process**

SWOT analysis, correspondence and browsing the internet to search for a suitable job(s), job application-cover letter drafting, drafting a winning resume', types of resume's -electronic, video and printed resume's

- Instruction: Students are required to prepare their video resume which will be assessed by the faculty member.

### **REFERENCES**

1. Chrissie: **Handbook of Practical Communication Skills**: Jaico Publishing house, 1999.
2. Daniels, Aubrey: **Bringing Out the Best in People**: Tata McGraw-Hill: New York, 2003
3. Wright, Goulstone, Mark: **Just Listen: Discover the Secret to getting through to absolutely anything**: American Management Association, 2010.
4. Lewis, Norman: **Word Power Made Easy**: Goyal Publications: New Delhi, 2009
5. Murthy, A.G, Krishna: **Ten Much** : Tata McGraw-Hill :New Delhi, 2010

### **E - RESOURCES**

1. [http://www.mindtools.com/pages/article/newTMC\\_05.htm](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.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code: 70322</b>	<b>THERMAL ENGINEERING LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		<b>-</b>	<b>-</b>	<b>4</b>

### **Course Objectives:**

To know and analyze the performance of Internal Combustion Engines, reciprocating compressor and boilers.

### **List of Experiments**

1. I.C. Engine Valve/ Port timing diagrams.
2. I.C. Engine Performance Test (4 -Stroke Diesel Engine).
3. I.C. Engine Performance Test (2-Stroke Petrol engine).
4. Evaluation of Engine friction by conducting Morse test on 4-Stroke Multi cylinder Petrol engine.
5. Evaluation of Engine friction by conducting Motoring /Retardation test on 4 stroke Diesel Engine.
6. Heat balance Test on Diesel Engine.
7. Determination of A/F Ratio and Volumetric Efficiency on 4 Stroke Multi Cylinder Petrol Engine.
8. Determine of Economical speed test for fixed load on 4-stroke Petrol Engine.
9. Determine optimum cooling water temperature on Diesel Engine.
10. Disassembly / Assembly of Engine.
11. Performance test on Reciprocating Air-compressor Test Rig.
12. Study of Boilers.
13. Evaluation of Variable Compression Ratio using Single Cylinder engine (Dual fuel).

### **Course Outcomes**

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

1. Construct the actual valve and port timing diagrams.
2. Analyse the performance of IC engines.
3. Investigate the performance of air compressor.
4. Evaluate the performance of steam generators.
5. Understand and analyse the performance of variable compression I.C. engines.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code:70P01</b>	<b>TECHNICAL SEMINAR</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		<b>-</b>	<b>-</b>	<b>4</b>

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code:70A04</b>	<b>MOOCs / NPTEL CERTIFICATION COURSE</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: Nil</b>		<b>-</b>	<b>2</b>	<b>-</b>

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. V Semester</b>		
<b>Code:70A05</b>	<b>INTERNSHIP – II</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: Nil</b>		<b>-</b>	<b>-</b>	<b>-</b>

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code:70H06</b>	<b>INDUSTRIAL MANAGEMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		<b>2</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objectives:**

Through reading the text, references and discussion of cases students will be able to understand the fundamentals underlying the management of an organization and Industrial Management.

**MODULE I Introduction to Management 6 Periods**

Introduction to Management: Entrepreneurship and organization, Concepts of Management, nature, importance and Functions of Management, Taylor's Scientific Management Theory, Systems Approach to Management, Fayol's Principles of Management: Mayo's Hawthorne Experiments.

Management Theories: Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Leadership Styles, Corporate Social responsibility.

**MODULE II Organizational Structures and Types 6 Periods**

Organizational Structures: Basic concepts related to Organization - Departmentation and Decentralization, Types of mechanistic and organic structures of organization.

Types of Organizations: Line organization, Line and staff organization, functional organization, committee organization, matrix organization, Virtual Organization, Cellular Organization, team structure, boundary less organization, inverted pyramid structure, lean and flat Organization structure.

**MODULE III Operations Management 6 Periods**

A: Operations Management: Objectives- product design process- Process selection-Types of production system (Job, batch and Mass Production), Plant location-factors- Urban-Rural sites comparison.

B: Plant layout: Types of Plant Layouts- Design of product layout- Line balancing (RPW method) Value analysis-Definition-types of values- Objectives- Phases of value analysis- Fast diagram.

**MODULE IV Work Study and Statistical Quality Control 7 Periods**

Work Study: Introduction, definition, objectives, steps in work study, Method study, definition, objectives, and steps of method study. Work Measurement, purpose, types of study, stop watch methods, steps, key rating, allowances, standard time calculations, work sampling.

Statistical Quality Control: variables-attributes, Shewart control charts for variables- chart, R chart, – Attributes-Defective-Defect- Charts for attributes-p-chart -c chart (simple Problems), acceptance Sampling- Single sampling- Double sampling plans-OC curves, Deming's contribution to quality.

## **MODULE V Project Management and contemporary practices**

**7 Periods**

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)

Contemporary Management Practices: Basic concepts of ERP, Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma, Capability Maturity Model (CMM), Bench marking, Balanced Score card.

### **TEXT BOOKS**

1. Aryasri, “**Management Science**”, 4<sup>th</sup> edition, TMH, 2004.
2. Stoner, Freeman, Gilbert, “**Management**”, 6<sup>th</sup> Ed, Pearson Education, New Delhi, 2004.

### **REFERENCES**

1. Kotler Philip & Keller Kevin Lane, “**Marketing Management**”, PHI, 12<sup>th</sup> edition, 2005
2. Koontz & Weihrich, “**Essentials of Management**”, TMH, 6<sup>th</sup> edition, 2005.
3. Panneerselvam, “**Production and Operations Management**”, PHI, 2012.
4. Memoria & S.V. Gauker, “**Personnel Management**”, Himalaya, 25<sup>th</sup> edition, 2005
5. Samuel C. Certo, “**Modern Management**”, PHI, 9<sup>th</sup> edition, 2005.

### **E - RESOURCES**

1. <http://www.learnerstv.com/Free-Management-Video-lectures-ltv656-age1.htm>
2. <http://www.learnerstv.com/Free-Management-Video-lectures-ltv728-age1.htm>
3. <http://freevideolectures.com/Course/2371/Project-and-Production-management>
4. <http://nptel.ac.in/courses/110106044/>
5. <https://www.youtube.com/watch?v=obzp6biyAN0>

### **COURSE OUTCOMES**

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

1. Understand the various concepts, principles and theories of management.
2. Design the structure of an organization through understanding various structures of organizations.
3. Understand the basic concepts and processes of operations management.
4. Understand the concept of work study and Statistical Quality Control.
5. Understand the basics of project management and also learns various contemporary management practices.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code:70323</b>	<b>METROLOGY AND INSTRUMENTATION</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objectives:**

The objective of this subject is to provide basic knowledge of different mechanical measuring instruments and gauges.

**MODULE I: Systems of Limits, Fits and Tolerance & Limit Gauges 10 Periods**

Systems of Limits and Fits: Introduction, normal size, tolerance limits, deviations, allowance, fits and their types – unilateral and bilateral tolerance system, hole and shaft basis systems – interchangeability and selective assembly. Indian standard Institution system – British standard system, International Standard system for plain and screwed work.

Limit Gauges: Taylor's principle – Design of go and No go gauges, plug ring, snap, gap, taper, profile and position gauges.

**MODULE II: Linear, Angle and Taper Measurement & Optical Measuring Instruments 10 Periods**

Linear Measurement: Length standard, line and end standard, slip gauges – calibration of the slip gauges, Dial indicator.

Measurement of Angles and Tapers: Different methods – Bevel protractor – angle slip gauges – spirit levels – sine bar – Rollers and spheres used to determine the tapers.

Optical Measuring Instruments: Tool maker's microscope and its uses – collimators, optical projector, auto collimator and interferometer.

**MODULE III: Surface Roughness Measurement & Instrumentation 10 Periods**

A: Surface Roughness Measurement: Profilo graph. Talysurf, ISI symbols for indication of surface finish. Comparators-Types-Mechanical, Electrical, optical and pneumatical compactors.

B: Instrumentation – Basic principles of measurement – Measurement systems, generalized configuration and functional descriptions of measuring instruments – examples. Dynamic performance characteristics – sources of error, Classification and elimination of error.

**MODULE IV: Measurement of Displacement & Temperature 09 Periods**

Measurement of Displacement: Theory and construction of various transducers to measure displacement – Piezo electric, Inductive, capacitance, resistance, ionization and Photo electric transducers, Calibration procedures.

Measurement of Temperature: Classification – Ranges – Various Principles of measurement – Expansion, Electrical Resistance – Thermistor – Thermocouple – Pyrometers – Temperature Indicators.

## **MODULE V: Strain Measurements & Elements of Control Systems 09 Periods**

Stress Strain Measurements: Various types of stress and strain measurements – electrical strain gauge – gauge factor – method of usage of resistance strain gauge for bending compressive and tensile strains – usage for measuring torque, Strain gauge Rosettes.

Elements of Control Systems: Introduction, Importance – Classification – Open and closed systems, Servo mechanisms – Examples with block diagrams – Temperature, speed & position control systems.

### **TEXT BOOKS**

1. R.K. Jain, “**Engineering Metrology**”, Khanna Publishers, 2016.
2. Backwith, Marangoni, Lienhard, “**Mechanical Measurements**”, Pearson Education, 2015.
3. Dr.D.S.Kumar, “**Mechanical Measurements and Control**”, Metropolitan Book Co.Pvt.Ltd.

### **REFERENCES**

1. M. Mahajan, “**A Text book of Metrology**”, Danpath Rai & Co. 2010
2. J.F.W.Galyer, Charles Reginald Shotbolt, “**Metrology for Engineers**”, 5th edition, Cengage Learning Publisher, 2014.
3. Doebelin O.E, Manik. D.N “**Measurement System**”, Tata McGraw Hill, 2015.
4. I C Gupta, “**Engineering Metrology**”, Danpath Rai & Co., 2016.
5. S.Bhaskar, “**Instrumentation and Control systems**”, Anuradha Agencies.

### **E - RESOURCES**

1. <http://home.iitk.ac.in/~vkjain/Lecture%204-Metrology-F-21-8-14.pdf>
2. [http://users.encs.concordia.ca/~nrskumar/Index\\_files/Mech6491/Lecture%201.pdf](http://users.encs.concordia.ca/~nrskumar/Index_files/Mech6491/Lecture%201.pdf)
3. <http://nptel.ac.in/courses/112106179/19>
4. <https://www.youtube.com/watch?v=qbKnW42ZM5c>
5. <https://www.degruyter.com/view/j/mms>
6. <http://www.metrology-journal.org/>

### **Course Outcomes**

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

1. Understand the Systems of Limits, Fits and Tolerance & Limit Gauges.
2. Illustrate Linear, Angle and Taper measurement instruments & optical measuring instruments.
3. Measure Surface Roughness and know about Instrumentation system.
4. Apply the instruments for displacement & temperature.
5. Understand the stress strain measurements & elements of control systems.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code:70324</b>	<b>HEAT TRANSFER</b> <i>(Use of Standard HMT data book is permitted)</i>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>2</b>	<b>2</b>	<b>-</b>

**Prerequisites:** Thermal Engineering – I

**Course Objectives:**

The objective of the course is to provide knowledge of different modes of heat transfer and their applications.

**MODULE I: Introduction & 1D Steady State Heat Conduction 10 Periods**

Introduction: Modes and mechanisms of heat transfer–Basic laws of heat transfer–General discussion about applications of heat transfer.

Conduction Heat Transfer: Fourier rate equation–General heat conduction equation in Cartesian, Cylindrical and Spherical coordinates. Simplification and forms of the field equation – steady, unsteady and periodic heat transfer – Initial and boundary conditions.

One Dimensional Steady State Conduction Heat Transfer: Homogeneous slabs, hollow cylinders and spheres – overall heat transfer coefficient – electrical analogy – Critical radius of insulation.

**MODULE II: Extended surfaces & 1D Transient Heat Conduction 10 Periods**

One Dimensional Steady State Conduction Heat Transfer: Variable Thermal conductivity–systems with heat sources or Heat generation. Extended surface (fins) Heat Transfer – Long Fin, Fin with insulated tip and Short Fin, Application to error measurement of Temperature.

One Dimensional Transient Conduction Heat Transfer: Systems with negligible internal resistance – Significance of Biot and Fourier Numbers - Chart solutions of transient conduction systems.

**MODULE III: Fundamentals of Convective heat transfer & Forced convection 10 Periods**

A: Convective Heat Transfer : Classification of systems based on causation of flow, condition of flow, configuration of flow and medium of flow – Dimensional analysis as a tool for experimental investigation –Buckingham Pi Theorem and method, application for developing semi – empirical non- dimensional correlation for convection heat transfer – Significance of non-dimensional numbers – Concepts of Continuity, Momentum and Energy Equations.

B: Forced convection: External Flows: Concepts about hydrodynamic and thermal boundary layer and correlations for convective heat transfer -Flat plates, Cylinders and spheres. Internal Flows: Concepts of Hydrodynamic and Thermal Entry Lengths –Flow through the pipes and ducts–Use of empirical relations for Pipe Flow and annulus flow.

**MODULE IV: Natural Convection, Boiling and Condensation 09 Periods**

Free Convection: Development of Hydrodynamic and thermal boundary layer along a vertical plate –heat transfer coefficient- Empirical relations for Vertical plates and pipes-Horizontal plates, cylinders and spheres.

Boiling: Pool boiling–Regimes, heat transfer correlations for Nucleate boiling, Critical Heat flux and Film boiling.

Condensation: Film wise and drop wise condensation–Nusselt’s Theory of Condensation for vertical plate - Film condensation on vertical and horizontal cylinders using empirical correlations.

## **MODULE V: Heat Exchangers & Radiation Heat Transfer**

**09 Periods**

Heat Exchangers: Classification of heat exchangers–overall heat transfer Coefficient and fouling factor – Concepts of LMTD and NTU methods - Problems using LMTD and NTU methods-effectiveness of heat exchanger.

Radiation Heat Transfer: Principle and laws of radiation–Irradiation – emissivity- black and white body- total and monochromatic quantities– Radiation heat exchange between the surfaces – concepts of shape factor – reciprocity theorem – Emissivity – heat exchange between grey bodies use of electrical analogy for radiation heat exchange– radiation shields.

### **TEXT BOOKS**

1. R.C.Sachdeva, “**Fundamentals of Engg. Heat and Mass Transfer**”, New Age International, 2010.
2. C.P.Kothandaraman, “**Fundamentals of Heat and Mass Transfer**”, New Age International Publishers, 2012.

### **REFERENCES**

1. Frank P. Incropera, David P. Dewitt, Therodre L Bergman & Adrienne S. Lavene, “**Fundamentals of Heat Transfer & Mass Transfer**”, Wiley India Pvt. Ltd., 7<sup>th</sup> edition, 2011.
2. P.K.Nag, “**Heat Transfer**”, TMH Publications, 2011.
3. Ghoshdastidar, “**Heat Transfer**”, Oxford University Press, 2<sup>nd</sup> Edition 2008.
4. YunvsCengel and AfshinGhajar ,“**Heat and Mass Transfer**”, McGraw Hill Publications, 2011.
5. R S Yadav, “**Heat and Mass Transfer**”, Centre Publishing House, 1992.

### **E - RESOURCES**

1. <http://wins.engr.wisc.edu/teaching/mpfBook/node26.html>
2. <http://wins.engr.wisc.edu/teaching/mpfBook/node8.html>
3. <http://nptel.ac.in/courses/112101097/4>
4. <http://nptel.ac.in/courses/112101097/6>
5. <http://nptel.ac.in/courses/112101097/10>
6. <http://nptel.ac.in/courses/112101097/18>

### **Course Outcomes**

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

1. Understand and solve the problems in one dimensional steady state heat transfer.
2. Understand and solve the problems in one dimensional transient conduction heat transfer.
3. Understand and analyse convection and forced convection models.
4. Understand and analyse free convection, phase change and condensation.
5. Understand and analyse thermal radiation problems.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code:70325</b>	<b>MACHINE TOOLS</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		3	-	-

**Prerequisites:** Production Technology

**Course Objectives:**

The objective of this subject is to provide knowledge of all machine tools and to measure cutting forces while machining.

**MODULE I: Metal Cutting Theory 10 Periods**

Metal Cutting Theory: Elements of cutting process- Geometry of single point cutting tool and angles, Tool signature, chip formation and types of chips- built up edge and its effects, chip breakers. Mechanics of orthogonal cutting- Merchant's Force diagram, cutting forces- cutting speeds, feed, depth of cut, tool life, coolants, machineability - Tools materials. Cutting tool temperature measuring methods.

**MODULE II: Lathe Machine 10 Periods**

Lathe Machine: Principle of working, Specification of Lathe- types of Lathe- Work holders, tool holders-Box tools, Taper turning, thread cutting for Lathe attachments. Turret and Capstan lathe- collet chucks- other work holders- tool holding devices- box and tool layout. Principal features of automatic lathe- Classification- Single spindle and multi-spindle automatic lathe.

**MODULE III: Shaping, Slotting, Planning, Drilling and Boring Machines 10 Periods**

A: Shaping, Slotting and Planning Machines: Principles of working- Principal parts-specification, classification, operations performed. Machining time calculations.

B: Drilling and Boring Machines: Principles of working, specifications, types, operations performed- tool holding devices- twist drills- Boring machines-Fine Boring machines- Jig Boring machine. Deep hole drilling machine.

**MODULE IV: Milling Machine & Grinding Machine 09 Periods**

Milling Machine : Principles of working-specifications-classifications of milling machines-principal features of horizontal, vertical and universal milling machines- machining operation types, geometry of milling cutters- milling cutters- methods of indexing- Accessories to milling machines and milling cutters-methods of indexing.

Grinding Machine: Fundamentals- Theory of grinding- classification of grinding machine-cylindrical and surface grinding machine- Tool and cutter grinding machine- special types of grinding machines- Different types of abrasives- bonds specification of a grinding wheel and selection of a grinding wheel.

**MODULE V: Lapping, Honing and Broaching Machines & Principles of Design of Jigs and Fixtures 09 Periods**

Lapping, Honing and Broaching Machines : Lapping, honing and broaching machines- principle of working, specification of broaching machines, methods of broaching, broaching tools, Classification of Broaching machines, operations.

Comparison to grinding- lapping and honing- Kinematics scheme of Lapping, Honing and Broaching machines. Constructional features of speed and feed units, machining time calculations. Principles of design of Jigs and Fixtures: Classification of Jigs and Fixtures- Principles of location and clamping- Types of clamping & work holding devices. typical examples of Jigs and Fixtures.

**TEXT BOOKS**

1. P.C. Sharma, “**Production Technology (Machine Tools)**”, S.Chand Publishers, 7<sup>th</sup> edition, 2006.
2. Pakirappa, “**Metal Cutting and Machine Tool Engineering**”, Durga publication house, 1st edition, 2012.

**REFERENCES**

1. C.Elanchezhian and M.Vijayan, "**Machine Tools**", Anuradha Agencies Publishers, 2<sup>nd</sup> edition, 2008
2. B.S.Raghuvamshi, "**Workshop Technology-Vol II**", Anuradha Agencies Publishers, Dhanpat rai & company, 10<sup>th</sup> revised edition, 2014.
3. Steve F.Krar, Arthur R.Gill, Peter Smid Krar, Stephen F, "**Technology of Machine tools**", Mc Graw-Hill, 7<sup>th</sup> edition , 2011.
4. B.L.Juneja, "**Fundamentals of Metal cutting and machine tools**", New age Int. publishers, 2nd edition , 2017.
5. R.K.Jain and S.C.Gupta, "**Production Technology**", Khanna Publications, 16<sup>th</sup> edition, 2014.

**E - RESOURCES**

1. <http://nptel.ac.in/courses/112105126/5>
2. <https://www.journals.elsevier.com/international-journal-of-machine-tools>
3. [www.sciencedirect.com/science/journal/08906955/64](http://www.sciencedirect.com/science/journal/08906955/64)

**Course Outcomes**

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

1. Understand the basic concepts of metal cutting theory.
2. Know the working principles of different Lathes and its parts.
3. Know the working principles of special machines like shaping, slotting, planning & drilling machines.
4. Know the working principles of milling and grinding machines.
5. Know the working principles of lapping, honing, broaching and jigs & fixtures.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code:70326</b>	<b>CAD / CAM</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Machine drawing and Metal cutting and Machine Tools

**Course Objectives:**

The objective of the this subject is to enable the students to understand and handle design problems, 2D drafting and 3D modeling software systems, manual part programming, NC and CNC machines, group technology, FMS and computer aided quality control.

**MODULE I: Introduction to Computers & Computer Graphics 10 Periods**

Basics of Computers: Computers in Industrial Manufacturing, Product cycle, CAD / CAM Hardware- Basic structure, CPU, Memory types, input devices, display devices, hard copy devices and storage devices.

Computer Graphics: Raster scan graphics - Line Algorithms, coordinate system, database structure for graphics modeling, transformation of geometry, 2D & 3D transformations, mathematics of projections, clipping, hidden surface removal.

**MODULE II: Geometric Modeling 10 Periods**

Geometric modeling: Requirements, geometric modeling, geometric construction methods.

Wireframe modeling, Curve representation methods, Surface representation methods, Solid representation Methods-CSG, B-rep, modeling facilities desired.

**MODULE III: Drafting and Modeling Systems & Numerical Control 10 Periods**

A: Drafting and Modeling Systems: Basic geometric commands, layers, display control commands, editing, dimensioning and solid modeling.

B: Numerical control: NC, NC modes, NC elements, NC machine tools, structure of CNC machine tools, features of Machining center, turning center, CNC Part Programming fundamentals, manual part programming methods, Computer Aided Part Programming.

DNC –Components, types, functions and advantages.

**MODULE IV: Group Technology and FMS 09 Periods**

Group Technology: Part family, coding and classification, production flow analysis, advantages and limitations. Computer Aided Processes Planning- Retrieval type and Generative type.

Flexible Manufacturing Systems: Introduction of FMS, FMS equipments, Material handling and control systems Advantages and limitations of FMS.

**MODULE V: Computer Aided Quality Control & Computer Integrated Manufacturing Systems 09 Periods**

Computer Aided Quality Control: Terminology in quality control, the computer in QC, contacts inspection methods, noncontact inspection methods-optical and non optical. Computer aided testing, integration of CAQC with CAD/CAM.

Computer Integrated Manufacturing Systems: Types of Manufacturing systems, Machine tools and related equipment, computer control systems, and human labor in the manufacturing systems, CIMS benefits. Introduction, working principle of 3D printing.

## TEXT BOOKS

1. Mikell P.Groover, E. Zimmers, “**CAD/CAM**”, Pearson education, Inc. Twelfth impression, 2013.
2. P.N. Rao, “**CAD/CAM - Principles and applications**”, 3<sup>rd</sup>Edition, Tata McGraw-Hill Education Pvt. Ltd., 2010.

## REFERENCES

1. Ibrahim Zeid & R. Sivasubramanian, “**CAD / CAM Theory and Practice**”, 2<sup>nd</sup>Edition, Tata Mcgraw Hill, 2009.
2. P. Radhakrishnan, S. Subramanian and VRaju, “**CAD / CAM / CIM**”, 4<sup>rd</sup> Edition, New Age Publishers, 2016.
3. Groover, “**Automation, Production systems & Computer integrated Manufacturing**”, Pearson Education, 4<sup>rd</sup> edition, 2016.
4. Chennakesava R. Alavala “**CAD/CAM Concepts and applications**”, PHI learning Private limited , 2009.
5. Farid Amirouche, “**Principles of Computer Aided Design and Manufacturing**”, Pearson Prentice Hall, 2004.

## E - RESOURCES

1. [https://www.google.co.in/?gfe\\_rd=cr&ei=UGxXWf7-IMKL8QfX6qmABg&gws\\_rd=ssl#q=cad+cam+lecture+notes+pdf&spf=1498901685078](https://www.google.co.in/?gfe_rd=cr&ei=UGxXWf7-IMKL8QfX6qmABg&gws_rd=ssl#q=cad+cam+lecture+notes+pdf&spf=1498901685078)
2. [http://iare.ac.in/sites/default/files/lecture\\_notes/merged%20cad-cam%20lecture%20notes%2026-9-15\\_0.pdf](http://iare.ac.in/sites/default/files/lecture_notes/merged%20cad-cam%20lecture%20notes%2026-9-15_0.pdf)
3. <https://www.journals.elsevier.com/computer-aided-design/>
4. <https://www.slideshare.net/AbhayGore/mcq-for-cadcam>
5. <http://nptel.ac.in/courses/112102101/>
6. <https://www.youtube.com/watch?v=EgKc9L7cbKc&list=PLC3EE33F27CF14A06>

## Course Outcomes

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

1. Understand the fundamentals of computer aided drafting, design & manufacturing, 2D & 3D transformations.
2. Know the different geometric modeling techniques like wire frame, surface modeling and solid modeling.
3. Draw Drafting & Modeling systems and write numerical control part programming.
4. Know about Group Technology and Flexible manufacturing systems.
5. Understand basics of Computer Aided Quality Control & Identify the various elements and their activities in the Computer Integrated Manufacturing Systems.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code:70338</b>	<b>ENERGY CONSERVATION AND MANAGEMENT (Professional Elective – II)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>4</b>	<b>-</b>	<b>-</b>

**Prerequisites: Nil**

**Course Objectives:**

The students will be able to understand and analyze the energy data of industries, carryout energy accounting and balancing, conduct energy audit and suggest methodologies for energy savings and utilize the available resources in optimal ways.

**MODULE I: Introduction**

**13 Periods**

Energy - Power – Past & Present scenario of World; National Energy consumption Data – Environmental aspects associated with energy utilization –Energy Auditing: Need, Types, Methodology and Barriers. Role of Energy Managers. Instruments for energy auditing.

**MODULE II Thermal Systems**

**13 Periods**

Stoichiometry, Boilers, Furnaces and Thermic Fluid Heaters – Efficiency computation and ENCON measures. Steam: Distribution & Usage: Steam Traps, Condensate Recovery, Flash Steam Utilization, Insulators &Refractory.

**MODULE III: Lighting and Electrical Systems**

**13 Periods**

A: Illumination - Lux, Lumens, Types of lighting, Efficacy, LED Lighting and scope of ENCON in Illumination.

B: Components of EB billing – HT and LT supply, Transformers, Cable Sizing, Concept of Capacitors, Power Factor Improvement, Harmonics, Electric Motors - Motor Efficiency Computation, Energy Efficient Motors.

**MODULE IV: Energy Conservation in Major Utilities**

**13 Periods**

Pumps, Fans, Blowers, Compressed Air Systems, Refrigeration and Air Conditioning Systems – Cooling Towers – D.G. sets.

**MODULE V Economics**

**12 Periods**

Energy Economics – Discount Rate, Payback Period, Internal Rate of Return, Net Present Value, Life Cycle Costing –ESCO concept.

**REFERENCE BOOKS**

1. Witte. L.C., P.S. Schmidt, D.R. Brown, “**Industrial Energy Management and Utilisation**”, Hemisphere Publ, Washington.
2. Callaghn, P.W. “**Design and Management for Energy Conservation**”, Pergamon Press, Oxford.
3. Dryden. I.G.C., “**The Efficient Use of Energy**” Butterworths, London.
4. Steve Doty, Wayne C. Turner “**Energy Management Hand book**”, Fairmont Press; 8<sup>th</sup>Edition, 2012.
5. W.R. Murphy and G. McKay “**Energy Management**”, Butterworth-Heinemann Ltd, 2009.

## **E - RESOURCES**

1. <http://www.em-ea.org/>
2. <https://www.journals.elsevier.com/energy-conversion-and-management/>
3. <http://aea-al.org/wp-content/uploads/2015/07/1118838254.pdf>

## **Course Outcomes**

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

1. Understand the energy management approaches and role of energy manager.
2. Know about energy conservation measures in lighting and electrical systems.
3. Apply the principles of thermal engineering and energy management to improve the performance of thermal systems.
4. Learn about methods of energy conservation and energy efficiency for major utilities.
5. Carry out the economic analysis of energy utilization.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: 70339</b>	<b>REFRIGERATION AND AIR CONDITIONING (Professional Elective – II)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>4</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Thermal Engineering-II

**Course Objectives:**

The objective of this subject is to provide basic knowledge about different refrigeration cycles, refrigeration systems, air conditioning and air cooler.

**Codes/Tables:** Refrigeration tables and Psychrometry charts

**MODULE I: Introduction to Refrigeration & Air Refrigeration 14 Periods**

Introduction to Refrigeration: Necessity and applications – Unit of refrigeration and C.O.P. – Mechanical Refrigeration – Types of Ideal cycles of refrigeration.

Air Refrigeration: Bell Coleman cycle or Reversed Brayton Cycle, Open and Dense air systems – Actual air refrigeration system problems – Refrigeration needs of Air craft's.

**MODULE II: Principles of Evaporators & Vapour Compression Refrigeration. 14 Periods**

Principles of Evaporators: Classification – Working Principles, Expansion devices – Types – Working Principles, Refrigerants – Desirable properties – classification - refrigerants used – Nomenclature

Vapour Compression Refrigeration: Working principle and essential components of the plant – simple Vapour compression refrigeration cycle – COP – Representation of cycle on T-S and p-h charts – effect of sub cooling and super heating – cycle analysis – Actual cycle - Influence of various parameters on system performance – Use of p-h charts – numerical Problems.

**MODULE III: Vapor Absorption System & Steam Jet Refrigeration System. 12 Periods**

A: Vapor Absorption System – Calculation of max COP – description and working of NH<sub>3</sub> – water system and Li Br –water ( Two shell & Four shell) System. Principle of operation, Three Fluid absorption system, salient features.

B: Steam Jet Refrigeration System – Working Principle and Basic Components. Principle and operation of (i) Thermoelectric refrigerator (ii) Vortex tube or Hilsch tube.

**MODULE IV: Introduction to Air Conditioning 12 Periods**

Psychrometric Properties & Processes – Characterization of Sensible and latent heat loads - Need for Ventilation, Consideration of Infiltration – Load concepts of RSHF, GSHF- Problems, Concept of ESHF and ADP.

## **MODULE V: Requirements of Human Comfort and Concept of Effective Temperature & Air Conditioning systems 12 Periods**

Requirements of human comfort and concept of effective temperature- Comfort chart –Comfort Air conditioning – Requirements of Industrial air conditioning, Air conditioning - Load Calculations.

Air Conditioning system - Classification of equipment, cooling, heating humidification and dehumidification, filters, grills and registers, fans and blowers. Heat Pump – Heat sources – different heat pump circuits.

### **TEXT BOOKS**

1. C.P. Arora, “**Refrigeration & Air Conditioning**”, Tata McGraw-Hill Education, 3<sup>rd</sup> Edition, 2010.
2. S.C.Arora & Domkundwar “**A Course in Refrigeration and Air conditioning**”, Dhanpatrai Publications, 3<sup>rd</sup> edition, 1980.

### **REFERENCES**

1. Manohar Prasad “**Refrigeration and Air Conditioning**” New Age International, 2<sup>nd</sup> Edition, 2003
2. Dossat “**Principles of Refrigeration**”, Pearson, 4<sup>th</sup> Edition, 2009.
3. P.L.Bellaney “**Refrigeration and Air Conditioning**”, Khanna Publishers, 6<sup>th</sup> edition, 2013.
4. P.N.Ananthanarayan “**Basic Refrigeration and Air Conditioning**” TMH, 4<sup>th</sup> Edition, 2013
5. R.S. Khurmi & J.K Gupta “**A Text Book of Refrigeration and Air Conditioning**”, S. Chand - Eurasia Publishing House (P) Ltd., 2008.

### **E - RESOURCES**

1. <http://nptel.ac.in/courses/112105128/>
2. <http://nptel.ac.in/courses/112105129/>
3. <http://nptel.ac.in/courses/112107208/>
4. International Journal of Refrigeration.
5. International Journal of Air-Conditioning and Refrigeration.

### **Course Outcomes**

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

1. Understand different cycles in refrigeration.
2. Analyse the performance of vapour compression refrigeration.
3. Analyse the performance of vapour absorption system and steam jet refrigeration system.
4. Use the Psychrometry charts in air conditioning problems.
5. Understand the knowledge about the requirement of human comfort, requirement of industrial air conditioning and different types of air conditioning systems.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: 70340</b>	<b>POWER PLANT ENGINEERING (Professional Elective –II)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:4</b>		<b>4</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Thermal Engineering – II

**Course Objectives:**

The objective of this subject is to provide knowledge of Power generation units & their working principles and non-conventional resources.

**MODULE I: Steam Power Plant & Combustion Process 13 Periods**

Introduction to the Sources of Energy: Resources and Development of Power in India.  
 Steam Power Plant: Plant Layout, Working of different Circuits, Fuel and handling equipments, types of coals, coal handling, choice of handling equipment, coal storage, ash handling systems.  
 Combustion Process: Properties of coal – overfeed and underfeed fuel beds, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and draught system, cyclone furnace, design and construction, Dust collectors, cooling towers and heat rejection. Corrosion and feed water treatment.

**MODULE II: Diesel Power Plant & Gas Turbine Plant 13 Periods**

Diesel Power Plant: Diesel Power Plant Introduction – IC Engines, types, construction– Plant layout with auxiliaries – fuel supply system, air starting equipment, lubrication and cooling system – super charging.  
 Gas Turbine Plant: Introduction – classification - construction – Layout with auxiliaries – Principles of working of closed and open cycle gas turbines. Combined Cycle Power Plants and comparison.

**MODULE III: Hydro Power Plant, Power from Non-Conventional Sources 13 Periods**

A: Hydro Electric Power Plant: Classification – Typical layouts – plant auxiliaries – plant operation pumped storage plants. Water power – Hydrological cycle / flow measurement – drainage area characteristics – Hydrographs – storage and Bondage – classification of dams and spill ways.  
 B: Power From Non-Conventional Sources: Utilization of Solar- Collectors- Working Principle, Wind Energy – types – HAWT and VAWT -Tidal Energy. Direct Energy Conversion - Solar energy, Fuel cells, Thermo electric and Thermo ionic, MHD generation.

**MODULE IV: Nuclear Power Station, Types of Reactors 13 Periods**

Nuclear Power Station: Nuclear fuel – breeding and fertile materials – Nuclear reactor –reactor operation.  
 Types of Reactors: Pressurized water reactor, Boiling water reactor, sodium-graphite reactor, fast Breeder Reactor, Homogeneous Reactor, Gas cooled Reactor, Radiation hazards and shielding – radioactive waste disposal.

## **MODULE V: Power Plant Economics and Environmental Considerations 12 Periods**

Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, Load curves, load duration curve. Definitions of connected load, Maximum demand, demand factor, average load, load factor, diversity factor – related exercises. Effluents from power plants and Impact on environment – pollutants and pollution standards – Methods of Pollution control.

### **TEXT BOOKS**

1. Arora and S. Domkundwar, “**A Course in Power Plant Engineering**”, Dhanpat Rai Publisher, 6<sup>th</sup> edition, 2011.
2. P.C.Sharma, “**Power Plant Engineering**”, S.K.Kataria Publisher, 2013.

### **REFERENCES**

1. P.K.Nag, “**Power Plant Engineering**”, TMH Publishers, II Edition, 2006.
2. ElWakil, “**Power station Engineering**”, McHill Publisher, 2<sup>nd</sup> edition, 2013.
3. G.D.Rai, “**An Introduction to Power Plant Technology**”, Khanna Publishers, 3<sup>rd</sup> edition, 2013.
4. Elanchezian, “**Power plant Engg**”, I.K. International Pub, 2007.
5. Rajput, “**A Text Book of Power Plant Engineering**”, Laxmi Publications, 4<sup>th</sup> edition, 2007.

### **E - RESOURCES**

1. [nptel.ac.in/courses/108105058/8](http://nptel.ac.in/courses/108105058/8)
2. [lecturenotes.in/note/1968/power-plant-engineering](http://lecturenotes.in/note/1968/power-plant-engineering)
3. <https://www.slideshare.net/.../power-plant-engineering-complete-five-unit-vtu-notes>
4. [www.scirp.org/journal/jpee/](http://www.scirp.org/journal/jpee/)
5. <https://www.irjet.net/archives/V2/i5/IRJET-V2I5185.pdf>
6. [powerengineeringmagazine.com](http://powerengineeringmagazine.com)

### **Course Outcomes**

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

1. Understand the process of steam power plants and combustion.
2. Get a clear view of the diesel power plant, Gas Turbine Plant and cycles.
3. Understand the functioning of Hydro Power Plant and sources of Power from Non-Conventional Sources.
4. Understand the functioning of Nuclear Power Station, Types of Reactors.
5. Know and analyse the Power Plant Economics and Environmental Considerations.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: 70327</b>	<b>MACHINE TOOLS AND METROLOGY LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		<b>-</b>	<b>-</b>	<b>4</b>

**Course Objectives:**

Student will be able to learn and practice various operations in lathe machine, shaper, planner, slotter, grinding machine, milling machine, cylindrical grinder, surface grinder and tool and cutter different measuring instruments.

**List of Experiments**

**Note: Any 6 experiments need to be performed from each Lab**

**Machine Tools Lab**

1. Study of general purpose machines - Lathe, Drilling machine, Milling machine, Shaper, Planning machine, slotting machine, Cylindrical Grinder, surface grinder and tool and cutter grinder.
2. Step turning, taper turning (swelling compound rest), grooving on lathe machine.
3. Taper turning by taper turning attachment.
4. Thread cutting and knurling using lathe machine.
5. Make a hole using lathe machine.
6. Drilling and Tapping using Radial drilling machine.
7. Cutting 'V' groove using shaping machine.
8. Cutting slots on circular shaft using slotting machine.
9. Cutting key ways using milling machines.
10. Surface Grinding using surface grinding machine.
11. Setting tool angles using tool & cutter grinder.
12. Cutting grooves/Plain surface using planning machine.
13. Cylindrical grinding by cylindrical grinding machine.

**Metrology Lab**

1. Measurement of lengths, heights, diameters by vernier caliper and micrometer etc.
2. Measurement of bores by internal micrometer and dial bore indicator.
3. Use of gear teeth vernier caliper and checking the chordal addendum and chordal height of spur gear.

4. Machine tool - alignment test on the lathe.
5. Measurement of screw thread and cutting tool profiles using Tool maker's microscope.
6. Angle and taper measurements by Bevel protractor and Sine bar.
7. Measurement of effective diameter of screw thread by two wire / three wire method.
8. Measurement of surface roughness.

### **Course Outcomes**

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

1. Perform various operations on lathe machine like turning, facing, tapering etc.
2. Estimation of the speed, feed, depth of cut for various operations.
3. Understand the mechanisms of all machines like shaper, slotter, milling machine, surface grinding machine etc.
4. Measure intricate profiles with proper calibration.
5. Use measuring instruments used in industry.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code: 70328</b>	<b>HEAT TRANSFER LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		<b>-</b>	<b>-</b>	<b>4</b>

**Course Objectives:**

Student will be able to understand the laws of heat transfer like Fourier's law, Newton's law of cooling and Stefan Boltzmann law through experimental setup.

**List of Experiments**

1. Performance study of Composite Slab Apparatus – Overall heat transfer co-efficient.
2. Performance study on Heat transfer through lagged pipe.
3. Performance study on Heat Transfer through a Concentric Sphere
4. Performance study on Thermal Conductivity of given metal rod.
5. Performance study on Heat transfer in pin-fin apparatus.
6. Experiment on Transient Heat Conduction.
7. Performance study on Heat transfer in forced convection apparatus.
8. Performance study on Heat transfer in natural convection.
9. Performance study on Parallel and counter flow heat exchanger.
10. Performance study of Emissivity apparatus.
11. Performance study on Stefan Boltzmann Apparatus.
12. Performance study on Heat transfer in drop and film wise condensation.
13. Performance study of Critical Heat flux apparatus.
14. Study of heat pipe and its demonstration.

**Course Outcomes**

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

1. Calculate heat transfer coefficient in both Natural and forced convection..
2. Calculate the efficiency and effectiveness of the fins.
3. Understand the mechanisms of heat transfer.
4. Calculate thermal conductivity of various materials.
5. Understand the Boiling and condensation processes.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code:70329</b>	<b>CAD / CAM LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		<b>-</b>	<b>-</b>	<b>4</b>

### Course Objectives:

The objective of this lab is to provide knowledge of drafting, modeling and CNC machines.

### List of Experiments:

**Note:** Any 12 experiments need to be performed.

#### PART MODELING:

1. Generation of various 3D Model through Extrude.
2. Generation of various 3D Model through Extrude.
3. Generation of various 3D Model through Revolve.
4. Generation of various 3D Model through Blend and sweep.
5. Feature based and Boolean based modeling.
6. Design of simple components & Assembly.
7. Design of simple components & Assembly.

#### CAM

1. Step Turning operation Using CNC XL Turn.
2. Multiple Turning operation Using CNC XL Turn.
3. Multiple Turning operation Using CNC XL Turn
4. Thread cutting operation Using CNC XL Turn.
5. Drilling Cycle Using CNC XL Mill.
6. Contour Cycle Using CNC XL Mill.
7. Contour Cycle Using CNC XL Mill
8. Pocketing Cycle Using CNC XL Mill.

**Modelling Software:** Creo

**CAM :** CNC XL - Turn & CNC XL - Mill

### Course Outcomes

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

1. Develop 2D and 3D models using modeling softwares.
2. Draw engineering drawings with different views, and an assembly of the objects that make up engineering systems, using a CAD system.
3. Describe the principles of Computer Aided Designing systems and the concepts of Geometric modeling, solid modeling, and feature-based design modeling.
4. Study of various post processors used in NC Machines.
5. Program a CNC machine tool using CAM systems by developing the G-code & M codes.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VI Semester</b>		
<b>Code:70M04</b>	<b>PROFESSIONAL ETHICS</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: Nil</b>	(Common for CE, EEE, ME,ECE, CSE, IT and Min.E)	-	2	-

**Prerequisites: NIL**

### **Course Objectives**

The objective is to make students familiar with professional ethics. It moulds the student to be trustworthy and honest with more professional responsibilities.

#### **MODULE I: Understanding Ethics**

**6 Periods**

Ethics- Definition- Ethical Vision- Engineering Ethics- Approaches to Ethical Behavior- Various Connotations of Engineering Ethics- Solving Ethical Conflicts- Ethical Judgment  
Ethical Theories- Consensus and Controversy- Models of Professional Roles- Theories about Right Action.

#### **MODULE II: Engineering Ethics**

**6 Periods**

Engineering ethics: Sense of Engineering Ethics- Variety of Moral Issues- Types of Inquiry- Moral Dilemmas- Moral Autonomy- Kohlberg's Theory- Gilligan's Theory.  
Code of Ethics- Code of Ethics for engineer, Sample Codes- IEEE, ASME, ASCE and CSI, Personal ethics Vs. Professional ethics.

#### **MODULE III: Engineer's Responsibilities and Rights**

**6 Periods**

A: Collegiality and Loyalty- Respect for Authority- Professional Rights- Sexual Harassment at Workplace.  
B: Conflicts of Interest- Confidentiality- Collective Bargaining- Role of Engineers in Promoting Ethical Climate and balanced Outlook on Law- Ethical Audit.

#### **MODULE IV: Engineer's Responsibility for Safety and Risk**

**6 Periods**

Safety and Risk- Types of Risk- Moral Responsibility of Engineers for Safety- Risk Benefit Analysis.  
Case Study- Bhopal Gas Tragedy- Chernobyl Disaster- Fukushima Nuclear Disaster.

#### **MODULE V: Global Issues and roles of engineers**

**6 Periods**

Multinational corporations, Environmental ethics, Computer ethics, Weapons development.  
Engineers as managers, Engineers as expert witnesses and advisors, engineers as responsible experimenters.

**TEXTBOOKS:**

1. Govindarajan M, Natarajan S, Senthil Kumar V. S, “**Engineering Ethics**”, Prentice Hall of India, New Delhi.
2. S.B.Gogate, “**Human Values & Professional Ethics**”, Vikas Publishing House Pvt., Ltd., First edition, 2011.

**REFERENCES BOOKS:**

1. Charles D. Fleddermann, “**Engineering Ethics**”, Pearson Education / Prentice Hall.
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “**Engineering Ethics – Concepts and Cases**”, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available) 2003.
3. C.G.Krishnadas Nair, “**Engineering Ethics**”, Harishree Publishing Company, Bangalore.
4. R.K.Shukla, Anuranjan Mishra, “**Human Values and Professional Ethics**” Published by A.B.Publication.

**E-RESOURCES:**

1. <https://www.slideshare.net/lizakhanam/business-ethics-and-corporate-governance-15588903>
2. <http://www.enterweb.org/ethics.htm>
3. <http://nptel.ac.in/courses/110105079/>
4. <http://nptel.ac.in/courses/109104032/>

**Course Outcomes:**

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

1. Understand the basics of ethics and ethical theories.
2. Understand the engineering ethics and code of ethics.
3. Learn the issues related to the engineer’s responsibilities and rights.
4. Understand Engineer’s Responsibility for Safety and Risk.
5. Understand the global issues in ethical point of view and their role in globalization era.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code:70330</b>	<b>FINITE ELEMENT METHOD</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>2</b>	<b>2</b>	<b>-</b>

**Prerequisites:** Advanced Calculus

**Course Objectives:**

The objective of the course is to provide knowledge of formulate, apply and solving the engineering problems using the finite element methods.

**MODULE I Introduction to FEM 10 Periods**

Introduction to FEM: basic concepts, historical back ground, application of FEM, general description, comparison of FEM With other methods. Weighted residual methods –general– comparisons – piecewise continuous trial functions example of a bar finite element –functional and differential forms – principle of stationary total potential – Rayleigh Ritz method – piecewise continuous trial functions – finite element method – application to bar element

**MODULE II One Dimensional Problems 10 Periods**

General form of total potential for 1-D applications – generic form of finite element equations – linear bar element – quadratic element –nodal approximation – development of shape functions – element matrices and vectors – example problems – extension to plane truss– development of element equations – assembly – element connectivity – global equations – solution methods –beam element – nodal approximation – shape functions – element matrices and vectors – assembly – solution – example problems

**MODULE III Two Dimensional Problems 10 Periods**

A:Introduction – approximation of geometry and field variable – 3 noded triangular elements – CST Elements– four noded rectangular elements – higher order elements – generalized coordinates approach to nodal approximations -- natural coordinates and coordinate transformations – triangular and quadrilateral elements.

B: Isoparametric elements – structural applications in 2D - elasticity equations –stress strain relations – plane problems of elasticity – element equations – assembly –need for quadrature – transformations to natural coordinates – numerical integration -Gaussian quadrature –problems axisymmetric problems-applications

**MODULE IV Applications in heat transfer & fluid mechanics 09 Periods**

One dimensional heat transfer element – application to one-dimensional heat transfer problems-Plane wall, composite wall and fins -scalar variable problems in 2-Dimensions – Applications to 2D heat transfer problems– Application to problems in fluid mechanics in 1D and 2-D

**MODULE V Dynamic Analysis 09 Periods**

Introduction – vibration problems – equations of motion based on weak form – longitudinal vibration of bars – transverse vibration of beams – consistent mass matrices – element equations –solution of eigen value problems – vector iteration methods – normal modes – transient vibrations – modeling of damping – mode superposition technique – direct integration methods

## **TEXT BOOKS**

1. S.S.Rao, “**The Finite Element Methods in Engineering**”, Elsevier Publishers, 5th edition, 2010.
2. Tirupati.KChandrupatla and Ashok. D. Belagunda “**Introduction to Finite Elements in Engineering**”, Pearson Prentice Hall, 3rd edition, 2011 .

## **REFERENCES**

1. Alavala“**Finite Element Methods**”, PHI Publishers, 2008.
2. J.N.Reddy“**An Introduction to finite element methods**”, TMH Publishers, 3rd edition, 2005.
3. O.C.Zienkowitz, “**The Finite element method in engineering science**”, McGrawhill Publishers, 2010.
4. Robert Cook “**Concepts and Applications of finite element analysis**” Wiley Publishers, 2009.

## **E - RESOURCES**

1. <http://icas.bf.rtu.lv/doc/Book.pdf>
2. <http://www.ceb.ac.in/knowledgecenter/EBOOKS/The%20Finite%20Element%20Method%20Vol1%20%20The%20Basis%20-%20R.%20Taylor.pdf>
3. <https://www.journals.elsevier.com/finite-elements-in-analysis-and-design/>
4. <http://www.sciencedirect.com/science/journal/0168874X>
5. <http://nptel.ac.in/courses/112104116/>
6. <http://nptel.ac.in/courses/112106135/>

## **Course Outcomes**

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

1. Develop comprehensive knowledge in the fundamental mathematical and physical problems.
2. Formulate a stiffness matrix and shape functions for 1D problems.
3. Formulate a stiffness matrix and shape functions for 2D problems.
4. Apply and analyse the finite element methods for heat transfer and fluid mechanics problems.
5. Apply and analyse the finite element methods for dynamic analysis problems.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code: 70331</b>	<b>AUTOMOBILE ENGINEERING</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objectives:**

The objective of this subject is to provide knowledge about various systems involved in automobiles.

**MODULE I Introduction, Fuel System & C.I. Engines 10 Periods**

Introduction : Components of four wheeler automobile – chassis and body – Types of chassis - power unit –power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction, turbo charging and super charging – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, re boring, de carbonization, nitriding of crank shaft.

Fuel System: S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pump – filters – carburetor – types – air filters – petrol injection. C.I. Engines: Requirements of diesel injection systems, types of injection systems, fuel pump, nozzle, spray formation, injection timing, testing of fuel pumps.

**MODULE II Cooling System & Ignition System 10 Periods**

Cooling System : Cooling Requirements, Air Cooling, Liquid Cooling, Thermo, water and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporating cooling – pressure sealed cooling – antifreeze solutions.

Ignition System: Function of an ignition system, battery ignition system, constructional features of storage, battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

**MODULE III Emission, Electrical System & Safety Electronics 10 Periods**

A: Emission from Automobiles: Pollution standards National and international – Pollution Control – Techniques – Multipoint fuel injection for SI Engines. Common rail diesel injection Energy alternatives – Solar, Photo-voltaic, hydrogen, Biomass, alcohols, LPG, CNG, liquid fuels and gaseous fuels, electrical-their merits and demerits.

B: Electrical System: Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge – oil pressure gauge. Safety electronics: electronics circuit airbag, anti slip regulation (ASR), electronic stability programs (ESP).

**MODULE IV Transmission System 09 Periods**

Transmission System: Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box, over drive torque converter. Propeller shaft – Hotch – Kiss drive, Torque tube drive, universal joint, differential rear axles – types – wheels and tyres.

## **MODULE V Suspension, Braking & Steering System**

**09 Periods**

Suspension System: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system, active and passive suspensions, magnetic dampers.

Braking System: Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder tandem master cylinder Requirement of brake fluid, Pneumatic and vacuum brakes, antilock braking systems (ABS) and EBS.

Steering System: Steering geometry – camber, castor, king pin rake, combined angle toe - in, center point steering. Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears – types, steering linkages, power steering.

### **TEXT BOOKS**

1. Kirpal Singh, “**Automobile Engineering**”, Vol.1 & 2, Seventh Edition, Standard Publishers, 1997.
2. Jain K.K. and Asthana. R.B, “**Automobile Engineering**” Tata McGraw Hill Publishers, 2002.

### **REFERENCES**

1. Newton, Steeds and Garet, “**Motor Vehicles**”, Butterworth Publishers,1989.
2. Joseph Heitner, “**Automotive Mechanics**,” Second Edition, East-West Press, 1999.
3. Martin W, Stockel and Martin T Stockle , “**Automotive Mechanics Fundamentals**,” The Good heart –Will Cox Company Inc, USA, 1978.
4. Heinz Heisler, “**Advanced Engine Technology**”, SAE International Publications USA, 1998.
5. Ganesan V. “**Internal Combustion Engines**”, Third Edition, Tata McGraw-Hill, 2007.

### **E - RESOURCES**

1. <https://ocw.mit.edu/courses/mechanical-engineering/2-61-internal-combustion-engines-spring-2008/>
2. [http://test.araiindia.com/index.php?option=com\\_content&view=article&id=36&Itemid=36](http://test.araiindia.com/index.php?option=com_content&view=article&id=36&Itemid=36)
3. <http://www.dli.ernet.in/handle/2015/205420>
4. International Journal of Automotive Technology - <http://www.springer.com/engineering/mechanical+engineering/journal/12239>

### **Course Outcomes**

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

1. Identify the different parts of the automobile and Differentiate SI and CI engines.
2. Understand the methods of cooling of IC engine, explain the air cooling system, and know the water cooling system of IC engine.
3. Understand the environmental implications of automobile emissions and electrical system.
4. Explain the working of various parts like engine, transmission, clutch, etc.
5. Describe how the steering, braking and the suspension systems operate.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code: 70332</b>	<b>OPERATIONS RESEARCH</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>2</b>	<b>2</b>	<b>-</b>

**Prerequisites: Nil**

**Course Objectives:**

The objective of this course is to provide knowledge and training in using optimization techniques under limited resources for the engineering and business problems.

**MODULE I          Linear Programming and Transportation          10 Periods**

Linear Programming: Origin of Operations Research – Study, The phase of an operation research - Linear programming – Formation of model - Graphical method – Simplex algorithm – Artificial variables technique – Big ‘M’ method - Two phase method.

Transportation: Optimal solution by North West corner method – VAM – Least cost method – MODI method.

**MODULE II          Assignment and Sequencing          10 Periods**

Assignment: Formulation - Unbalanced Assignment Problem – Hungarian algorithm – Traveling Salesman Problem.

Sequencing: Processing ‘n’ jobs through two machines, processing ‘n’ jobs through three machines - processing ‘n’ jobs through ‘m’ machines.

**MODULE III          Replacement and Game Theory          10 Periods**

A: Replacement: Replacement of items due to deterioration with and without time value of money, Group replacement policy.

B: Game Theory: Theory of games, competitive games, rules for game theory, mixed strategies, two person zero sum game, method of dominance, graphical method.

**MODULE IV          Queuing and Inventory Models          09 Periods**

Queuing Models: Queuing systems and structures – Notation parameter – Single server and multi-server models – Poisson input – Exponential service – Constant rate service – Infinite population.

Inventory Models: Economic order quantity models - With and without shortages. (Deterministic Demand). Quantity discount models –Inventory control models in practice.

**MODULE V          Network Model and Simulation          09 Periods**

Network Model: Basic terminologies, constructing a project network, network computations in CPM and PERT, Introduction to cost crashing.

Simulation: Types of simulation models and phases of simulation - Application, advantages and disadvantages of simulation Inventory and queuing problems.

## **TEXT BOOKS**

1. Premkumar Gupta and D.S.Hira, “**Operations Research**”, S.Chand Publications, 2005.
2. S.D.Sharma, “**Operations Research**”, Kedar nath ram Nath, Delhi, 2009.

## **REFERENCES**

1. Taha H.A., “**Operations Research**”, Prentice Hall of India, New Delhi, 6<sup>th</sup> Edition, 2003.
2. Shennoy G.V. and Srivastava U.K., “**Operation Research for Management**”, New AgeInternational, New Delhi, 2nd Edition, 2009
3. Hillier and Libermann “**Introduction to Operations Research**” McGraw hill edition, 2001
4. Budnick F.S. and Richard D Irwin “**Principles of Operations Research for Management**”, 3<sup>rd</sup> Edition, 2003.
5. Bazara M.J., Jarvis and Sherali H., “**Linear Programming and Network Flows**”, John Wiley,New Jersey, 4<sup>th</sup>Edition, 2010.

## **E - RESOURCES**

1. <http://www.inderscience.com/jhome.php?jcode=IJOR>
2. <https://www.journals.elsevier.com/european-journal-of-operational-research/>
3. <http://nptel.ac.in/courses/112106134/>
4. <http://nptel.ac.in/courses/112106131/>
5. <http://www.nptel.ac.in/courses/110106059/>

## **Course Outcomes**

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

1. Apply linear programming model and assignment model to domain specific situations and Analyze the various methods under transportation model and apply the model for testing the closeness of their results to optimal results.
2. Analyze the various assignment and sequencing models and apply them for arriving at optimal decisions.
3. Analyze and apply the various replacement policy and gaming strategies for arriving at optimal decisions.
4. Analyze and apply appropriate queuing and inventory techniques in real time applications.
5. Apply network model for all type of projects and make use of simulation.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code:70341</b>	<b>AUTOMATION IN MANUFACTURING (Professional Elective – III)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>2</b>	<b>2</b>	<b>-</b>

**Prerequisites:** Metal Cutting & Machine Tools and CNC Technology.

**Course Objectives:**

The objective of this subject is to provide knowledge of automated flow lines, line balancing, adoptive control systems and Business process Re- Engineering in manufacturing units.

**MODULE I: Introduction to Automation 10 Periods**

Introduction Types and strategies of automation, pneumatic and hydraulic components circuits, Automation in machine tools. Mechanical feeding and tool changing and machine tool control transfer the automaton.

**MODULE II: Automated Flow Lines 10 Periods**

Methods or work part transport transfer Mechanical buffer storage control function, design and fabrication consideration. General terminology and analysis of transfer lines without and with buffer storage, partial automation, implementation of automated flow lines.

**MODULE III: Line Balancing & Automated Material Handling 10 Periods**

A: Line balancing: Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

B: Automated material handling: Types of equipment, functions, analysis and design of material handling systems conveyor systems, automated guided vehicle systems.

**MODULE IV: Adaptive Control Systems 09 Periods**

Automated storage systems, automated storage and retrieval systems, work in process storage, interfacing handling and storage with manufacturing.

Adaptive control systems: Introduction, adaptive control with optimization, Adaptive control with constraints, Application of A.C. in machining operations. Use of various parameters such as cutting force, Temperatures, vibration and acoustic emission.

**MODULE V: Business process Re-engineering 09 Periods**

Business process Re-engineering: Introduction to BPE logistics, ERP, Software configuration of BPE, concurrent Engineering, Techniques of Rapid Proto typing.

**TEXT BOOKS**

1. M.P. Groover, **Automation, Production Systems and Computer Integrated Manufacturing**, PHI Publishers, 2009.
2. M.P. Groover, **“CAD / CAM”**, PHI Publishers, Pearson, 2008.

**REFERENCES**

1. Computer control of Manufacturing Systems by Yoram Coreom / TMH Publishers, 1989.
2. Radhakrishnan, **“CAD / CAM/ CIM”**, New Age International Publishers, 2016.
3. W. Buekinsham, **“Automation”**, Prometheus Books Publishers.

4. Beno Benhabib, “**Manufacturing: Design, Production, Automation, and Integration**”, Beno Benhabib, CRC Press, 2003.
5. Tien chien chang, Richard A. Wysk and Hsu-Pin Wang, “**Computer aided manufacturing**”, Pearson, 2009.

#### **E - RESOURCES**

1. <https://www.automationmag.com/>
2. <https://www.automationworld.com/>
3. <https://www.journals.elsevier.com/journal-of-manufacturing-processes/>

#### **Course Outcomes**

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

1. Understand the concept of pneumatic and hydraulic component circuits for automation.
2. Understand and analyze the automated flow lines system.
3. Understand assembly line and automated material handling system.
4. Know various types of automated storage systems and concept of adaptive control.
5. Learn the concept of Business process reengineering (BPR) and Rapid proto typing.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code:70342</b>	<b>ROBOTICS</b> (Professional Elective – III)	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>2</b>	<b>2</b>	<b>-</b>

**Prerequisites:** Dynamics of Machines

**Course Objectives:**

The objective of this subject is to provide design knowledge of robot arm, kinematics and dynamics links, Trajectory planning of robot and its applications in automation of Industries.

**MODULE I: Introduction 10 Periods**

Automation and Robotics, CAD/CAM and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system.

Components of the Industrial Robotics:-Degrees of freedom-End effectors: Mechanical gripper-magnetic-vacuum cup and other types of grippers-General consideration on gripper selection and design.

**MODULE II: Motion Analysis & Manipulator Kinematics 10 Periods**

Motion Analysis: Homogeneous transformations as applicable to rotation and translation – problems.

Manipulator Kinematics: Specifications of matrices, D-H notation, joint coordinates and world coordinates, Forward and inverse kinematics – problems.

**MODULE III : Dynamics 10 Periods**

A: Differential transformation and manipulators, Jacobians – problems. Lagrange, Euler and Newton – Euler formations – Problems.

B: Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion. Robot programming, languages and software packages. Introduction to Machine Vision.

**MODULE IV: Robot actuators and Feedback components 09 Periods**

Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.

Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.

**MODULE V: Robot Application in Manufacturing 09 Periods**

Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

**TEXT BOOKS**

1. Groover M P, “**Industrial Robotics**”, Tata McGraw-Hill publishing company limited, 2008.
2. R.K Mittal & I .J.Nagrath, “**Robotics and Control**”, Tata McGraw-Hill Education Pvt. Ltd. 2003

## REFERENCES

1. Fu K S, “**Robotics**”, McGraw Hill Education (India) Private Limited, 2013.
2. Philippe Coiffet, Michel Chirouze, “An Introduction to Robot Technology”, McGraw-Hill, 1983.
3. Richard D. Klafter, “**Robotic engineering and Integrated Approach**”, Prentice Hall Publishers, 1989.
4. H.Asada and J.E.Slotine, “**Robot Analysis and Control**”, John Wiley & Sons, 1986.
5. John J. Craig, “**Introduction to Robotics: Mechanics and Control**”, 3<sup>rd</sup> Edition, pearson/prentice Hall, 2005

## E - RESOURCES

1. <http://robot.fanucamerica.com/products/robots/industrial-robots.aspx>
2. <http://www.robotics.org/>
3. Advanced Robotic  
<http://www.tandfonline.com/action/showAxaArticles?journalCode=tadr20>
4. International Journal of Advance Robotics & Expert Systems (JARES)  
<http://airccse.com/jares/index.html>
5. <http://nptel.ac.in/courses/112101099/>
6. <http://nptel.ac.in/downloads/112101098/>

## Course Outcomes

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

1. Understand basic elements of robotics.
2. Understand and analyze motion and manipulator kinematics.
3. Understand and analyze Trajectory planning.
4. Understand and analyse electro pneumatic actuators and feedback mechanisms.
5. Know the various applications of industrial robot.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code:70343</b>	<b>PLANT LAYOUT AND MATERIAL HANDLING (Professional Elective – III)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>2</b>	<b>2</b>	<b>-</b>

**Prerequisites: Nil**

**Course Objectives:**

The objective of this subject is to provide knowledge of Layout planning and different material handling equipments.

**MODULE I: Introduction & Process Layout and Product Layout 10 Periods**

Introduction, Classification of Layout, Advantages and Limitations of different layout, Layout design procedures, Overview of the plant layout.

Process layout and product layout: Selection, specification Implementation and follow up, comparison of product and process layout.

**MODULE II: Heuristics for Plant Layout & Group Layout, Fixed Position Layout 10 Periods**

Heuristics for plant layout- ALDEP, CORELAP, CRAFT.

Group Layout, Fixed position layout. Quadratic assignment model Branch and Bound method.

**MODULE III: Introduction to Material Handling Systems 10 Periods**

A: Introduction to Material Handling Systems: Material handling principles.

B: Classification of Material Handling Equipment, Relationship of Material Handling to plant layout.

**MODULE IV Methods of Material Handling Systems 09 Periods**

Selection, Material Handling method path, Equipment, function oriented systems.

**MODULE V: Methods to minimize cost of material handling 09 Periods**

Maintenance of material handling equipments, Safety in handling. Ergonomics of Material Handling equipment. Design, miscellaneous equipments.

**TEXT BOOKS**

1. P.B. Mahapatra, “**Operation Management**”, PHI Publications, 2010.
2. DR. K C Arora & Shinde “**Aspects of Material Handling**”, Lakshmi Publications, 2007.

**REFERENCES**

1. RL Francis “**Facility Layout and Location: An Analytical Approach**”, LF Mc Linnis jr and White, PHI Publications, 1992.
2. R Pannerselvam “**Production and Operation Management**”, PHI Publications, 2012.
3. Ray and Sidhartha “**Introduction to Material Handling**”, New Age Publications, 2007.

## **E - RESOURCES**

1. [link.springer.com/book/10.1007%2F978-1-349-01786-7](http://link.springer.com/book/10.1007%2F978-1-349-01786-7)
2. [www.strategosinc.com/facilities\\_planning.htm](http://www.strategosinc.com/facilities_planning.htm)
3. [serialsjournals.com/serialjournalmanager/pdf/1331984010.pdf](http://serialsjournals.com/serialjournalmanager/pdf/1331984010.pdf)
4. <https://www.ijsr.net/archive/v3i5/MDIwMTMyMTQ5.pdf>
5. [nptel.ac.in/courses/112107142/](http://nptel.ac.in/courses/112107142/)
6. [nptel.ac.in/courses/112107143/32](http://nptel.ac.in/courses/112107143/32)

### **Course outcomes**

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

1. Understand the material flows, inventory handling and management, thereby improving the efficiency.
2. Design where the work stations and equipment are to be located along the line of production.
3. Creates awareness on objectives of plant layout – Sense of Unity, Minimum Movement of People, material and Resources, Safety and Flexibility.
4. Learn Variety of material Handling Systems – Manual, Semi-Automated and Automated.
5. Learn maintenance of Material Handling Equipments and their Safety Measures.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code: 70344</b>	<b>DESIGN OF PRESS TOOLS, JIGS AND FIXTURES (Professional Elective – IV)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

Approved Design Data Book is permitted.

**Course Objectives:**

To understand the functions and design principles of Jigs, fixtures and press tools and to gain proficiency in the development of required views of the final design.

**MODULE I: Locating and Clamping Principles 10 Periods**

Objectives of tool design- Function and advantages of Jigs and fixtures – Basic elements – principles of location – Locating methods and devices – Redundant Location – Principles of clamping – Mechanical actuation – pneumatic and hydraulic actuation Standard parts – Drill bushes and Jig buttons – Tolerances and materials used.

**MODULE II: Jigs and Fixtures 10 Periods**

Design and development of jigs and fixtures for given component- Types of Jigs – Post, Turnover, Channel, latch, box, pot, angular post jigs – Indexing jigs – General principles of milling, Lathe, boring, broaching and grinding fixtures – Assembly, Inspection and Welding fixtures – Modular fixturing systems- Quick change fixtures.

**MODULE III: Press Working Terminologies and Elements of Cutting Dies 10 Periods**

A: Press Working Terminologies – operations – Types of presses – press accessories – Computation of press capacity – Strip layout – Material Utilization – Shearing action – Clearances – Press Work Materials – Center of pressure.

B: Design of various elements of dies – Die Block – Punch holder, Die set, guide plates – Stops – Strippers – Pilots – Selection of Standard parts – Design and preparation of four standard views of simple blanking, piercing, compound and progressive dies.

**MODULE IV: Bending and Drawing Dies 09 Periods**

Difference between bending and drawing – Blank development for above operations – Types of Bending dies – Press capacity – Spring back – knockouts – direct and indirect – pressure pads – Ejectors – Variables affecting Metal flow in drawing operations – draw die inserts – draw beadsironing – Design and development of bending, forming, drawing, reverse redrawing and combination dies – Blank development for axisymmetric, rectangular and elliptic parts – Single and double action dies.

**MODULE V: Other Forming Techniques 09 Periods**

Bulging, Swaging, Embossing, coining, curling, hole flanging, shaving and sizing, assembly, fine Blanking dies – recent trends in tool design- computer Aids for sheet metal forming Analysis – basic introduction - tooling for numerically controlled machines- setup reduction for work holding – Single minute exchange of dies – Poka Yoke.

## **TEXT BOOKS**

1. Joshi, P.H. “**Jigs and Fixtures**”, Second Edition, Tata McGraw Hill Publishing Co., Ltd., New Delhi, 2010.
2. Joshi P.H “**Press tools - Design and Construction**”, wheels publishing, 4<sup>th</sup> edition, 1996.

## **REFERENCES**

1. Venkataraman. K., “**Design of Jigs Fixtures & Press Tools**”, Tata McGraw Hill, New Delhi, 2015.
2. Donaldson, Lecain and Goold “**Tool Design**”, 4th Edition, Tata McGraw Hill, 2012.
3. Kempster, “**Jigs and Fixture Design**”, Third Edition, Hoddes and Stoughton, 1998.
4. Hoffman “**Jigs and Fixture Design**”, Thomson Delmar Learning, Singapore, 2012.
5. ASTME “**Fundamentals of Tool Design**” Prentice Hall of India, 2013.

## **E - RESOURCES**

1. [nptel.ac.in/courses/112105127/pdf/LM-33.pdf](http://nptel.ac.in/courses/112105127/pdf/LM-33.pdf)
2. [nptel.ac.in/courses/112105126/34](http://nptel.ac.in/courses/112105126/34)
3. [nptel.ac.in/courses/112105126/35](http://nptel.ac.in/courses/112105126/35)
4. [nptel.ac.in/courses/112105126/](http://nptel.ac.in/courses/112105126/)

## **Course Outcomes**

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

1. Understand the functions of jigs & fixtures, elements, principles of location and clamping methods.
2. Understand design of jigs & fixtures, fixture assembly, fixturing systems.
3. Understand types of presses & press working, design of dies for various operations.
4. Understand blank development, design & development of dies for bending & drawing.
5. Understand design of forming dies, recent trends in tool design.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code: 70345</b>	<b>UNCONVENTIONAL MACHINING PROCESSES (Professional Elective – IV)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objectives:**

The objective of this subject is to provide knowledge of using various unconventional machining processes and their applications in industries.

**MODULE I: Introduction & Ultrasonic Machining 10 Periods**

Need for non-traditional machining methods-Classification of modern machining processes – considerations in process selection - Materials - Applications.

Ultrasonic machining – Elements of the process, mechanics of metal removal process parameters, economic considerations, applications and limitations, recent development..

**MODULE II: Abrasive Jet, Water Jet and Abrasive Water Jet Machining & Electro Chemical Processes 10 Periods**

Abrasive Jet Machining, Water Jet Machining and Abrasive Water Jet Machining: Basic principles, equipments, process variables, and mechanics of metal removal, MRR, application and limitations. Electro - Chemical Processes : Fundamentals of electro chemical machining, electrochemical grinding, electro chemical honing and deburring process, metal removal rate in ECM, Tool design, Surface finish and accuracy economic aspects of ECM – Simple problems for estimation of metal removal rate.

**MODULE III: Thermal Metal Removal Processes 10 Periods**

A: Thermal Metal Removal Processes: General Principle and applications of Electric Discharge Machining, Electric Discharge Grinding and electric discharge wire cutting processes – Power circuits for EDM, Mechanics of metal removal in EDM.

B: Parameters, Tool and Dielectric Fluid: Process parameters, selection of tool electrode and dielectric fluids, methods surface finish and machining accuracy, characteristics of spark eroded surface and machine tool selection. Wire EDM, principle, applications.

**MODULE IV: Electron Beam Machining and Laser Beam Machining 09 Periods**

Generation and control of electron beam for machining, theory of electron beam machining. General Principle and application of laser beam machining – thermal features, cutting speed and accuracy of cut. Comparison of thermal and non-thermal processes

**MODULE V: Advanced Machining Methods 09 Periods**

Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries. Fundamentals of Chemical machining - principle- maskants –etchants- advantages and applications. Magnetic abrasive finishing, Abrasive flow finishing, Electro stream drilling, shaped tube electrolytic machining.

## **TEXT BOOKS**

1. V.K Jain, “**Advanced machining processes**”, Allied publishers, 2010.
2. P. K. Mishra, “**Unconventional machining process**”, Standard Publishers, 2014.

## **REFERENCES**

1. Pandey P.C. and Shah H.S., “**Modern Machining Process**”, TMH Publishers, 1<sup>st</sup> edition, 2012.
2. Bhattacharya A, “**New Technology**”, the Institution of Engineers India, 1984.
3. Baffa & Rakesh Sarin, “**Modern Production and Operations Management**”, John Wiley & Sons, 8<sup>th</sup> edition, 2017.
4. Kalpakjian, “**Manufacturing Engineering and Technology**”, Pearson Publications, 4<sup>th</sup> edition, 2002.
5. HMT, “**Production Technology**”, Tata McGraw-Hill Education, 2006.

## **E - RESOURCES**

1. [www.nmri.go.jp/eng](http://www.nmri.go.jp/eng), Elementary knowledge of metalworking
2. Videos about machining published by Institut für den Wissenschaftlichen Film.
3. [www.iaeng.org/publication/WCE2011/WCE2011\\_pp2154-2158.pdf](http://www.iaeng.org/publication/WCE2011/WCE2011_pp2154-2158.pdf)
4. [www.tandfonline.com/doi/abs/10.1080/21693277.2014.899934](http://www.tandfonline.com/doi/abs/10.1080/21693277.2014.899934)
5. [nptel.ac.in/courses/112105126/36](http://nptel.ac.in/courses/112105126/36)
6. [nptel.ac.in/downloads/112105127/](http://nptel.ac.in/downloads/112105127/)

## **Course Outcomes**

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

1. Understand the basics of non-traditional machining methods.
2. Understand the process of Abrasive Jet Machining, Water Jet Machining and Abrasive Water Jet Machining & Electro Chemical Processes.
3. Understand the process of Thermal Metal Removal Processes.
4. Understand the process of Electron Beam Machining and Laser Beam Machining.
5. Understand the process of plasma machining, chemical machining, magnetic abrasive finishing, and abrasive flow machining processes.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code: 70346</b>	<b>PRODUCT DESIGN AND DEVELOPMENT (Professional Elective – IV)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites: Nil**

**Course Objectives:**

The students will be able to get knowledge about product development, specifications, concepts and architecture which is followed in the industry.

**MODULE I: Product Development 10 Periods**

Product development versus design, product development process, product cost analysis, cost models, reverse engineering and redesign product development process, new product development, tear down method.

**MODULE II: Product Specifications 10 Periods**

Establishing the product specifications– Target specifications – Refining specifications, concept generation-Clarify the problem – Search internally – Search externally – Explore systematically - Reflect on the Results and the Process.

**MODULE III: Product Concepts 10 Periods**

Concept generation, product configuration, concept evaluation and selection, product embodiments, Quality function deployment, product design specification, physical prototypes- types and technique, dimensional analysis, design of experiments.

**MODULE IV: Product Architecture 09 Periods**

Concept selection- Screening – scoring, Product architecture – Implication of architecture - Establishing the architecture – Related system level design issues.

**MODULE V: Product Improvement 09 Periods**

Reliability, failure identification techniques, Poka-Yoke, Design for the environment, design for maintainability, product safety, liability and design, design for packaging, factorial analysis- ANOVA, factorial experiments, examples.

**TEXT BOOKS**

1. Kevin Otto and Kristin Wood, “**Techniques in Reverse Engineering and New Product Development**”, Pearson Education, Chennai, Edition III, 2014.
2. Karl T.Ulrich and Steven D.Eppinger “**Product Design and Development**”, McGrawHill International, 4<sup>th</sup> Edition, 2014.

**REFERENCES**

1. Chitale A.V. and Gupta R.C., “**Product Design and Manufacturing**”, 6<sup>th</sup> Edition, PHI, 2013.
2. Kemnech Crow, “**Concurrent Engg. Integrated Product Development**”, DRM Associates, 26/3 via Olivera, Palas Verdes, CA 90274 (310) 377-569, Workshop Book.

3. Stephen Rosenthal, "**Effective Product Design and Development**", Business OneOrwin Homewood, 1992, ISBN, 1-55623-603-434.
4. Stuart Pugh, "**Total Design – Integrated Methods for successful Product Engineering**", Addison Wesley Publishing, Neyourk, NY, 1991, ISBN 0-202-41639-5.

#### **E - RESOURCES**

1. [nptel.ac.in/courses/112107217/](http://nptel.ac.in/courses/112107217/)
2. [nptel.ac.in/courses/112107143/26](http://nptel.ac.in/courses/112107143/26)
3. [nptel.ac.in/courses/112107217/14](http://nptel.ac.in/courses/112107217/14)
4. [nptel.ac.in/courses/112107143/35](http://nptel.ac.in/courses/112107143/35)
5. [nptel.ac.in/courses/112107217/10](http://nptel.ac.in/courses/112107217/10)

#### **Course Outcomes**

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

1. Apply the concept for new product development.
2. Apply knowledge on the concepts of product specification.
3. Describe the principles of industrial design and prototyping.
4. Apply knowledge on product architecture.
5. Examine the concept of product development and customer needs.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code: 70333</b>	<b>SIMULATION AND ANALYSIS LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		<b>-</b>	<b>-</b>	<b>4</b>

**Course Objectives:**

To give exposure to software tools needed to analyze engineering problems and to expose the students to different applications of simulation and analysis tools.

**List of Experiments**

**A. SIMULATION**

1. MATLAB basics, Dealing with matrices, Graphing-Functions of one variable and two variables.
2. Use of Matlab to solve simple problems in vibration.
3. Mechanism Simulation using Multibody Dynamic software.

**B. ANALYSIS**

1. Force and Stress analysis using link elements in Trusses, cables etc.
2. Stress and deflection analysis in beams with different support conditions.
3. Stress analysis of flat plates and simple shells.
4. Stress analysis of axi - symmetric components.
5. Thermal stress and heat transfer analysis of plates.
6. Thermal stress analysis of cylindrical shells.
7. Vibration analysis of spring-mass systems.
8. Model analysis of Beams.
9. Harmonic, transient and spectrum analysis of simple systems.

**Course Outcomes**

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

1. Exploit software tools needed to analyze engineering problems.
2. Model, analyze and simulate experiments to meet real world system.
3. Expand knowledge on different applications of simulation and analysis tools.
4. Solve vibration based problems.
5. Understand the time domain problems.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code: 70334</b>	<b>INSTRUMENTATION AND PRODUCTION DRAWING LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:2</b>		<b>-</b>	<b>-</b>	<b>4</b>

### **Course Objectives:**

The objective of this subject is to provide practical knowledge of measuring instruments used in instrumentation and practicing production drawings. (Drawing parts drawing from assembly drawings with all representations which are mandatory to produce a component in a manufacturing unit).

### **A: INSTRUMENTATION LAB**

1. Calibration of Pressure Gauges
2. Study and calibration of Mcleod gauge for low pressure.
3. Calibration of transducer for temperature measurement. (RTD, Thermister and Thermocouple).
4. Study and calibration of LVDT transducer for displacement measurement.
5. Calibration of strain gauge for strain measurement.
6. Calibration of capacitive transducer for angular displacement.
7. Study and calibration of photo and magnetic speed pickups for the measurement of speed.
8. Study and calibration of a rotometer for flow measurement.

### **B: PRODUCTION DRAWING PRACTICE**

#### **MODULE I:**

Conventional representation of Materials – conventional representation of parts – screw joints, welded joints, springs, gears, electrical, hydraulic and pneumatic circuits – methods of indicating notes on drawings.

#### **MODULE II:**

**Limits and Fits:** Types of fits, exercises involving selection / interpretation of fits and estimation of limits from tables.

#### **MODULE III:**

**Form and Positional Tolerances:** Introduction and indication of the tolerances of form and position on drawings, deformation of run out and total run out and their indication.

#### **MODULE IV:**

**Surface roughness and its indication:** Definitions – finishes obtainable from various manufacturing processes, recommended surface roughness on mechanical components. Heat treatment and surface treatment symbols used on drawings.

#### **MODULE V:**

**Detailed and Part drawings:** Drawing of parts from assembly drawings with indications of size, tolerances, roughness, form and position errors etc.



## **Course Outcomes**

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

1. Know conventional representations of materials screw joints, welded joints, springs gears etc. type of fits, interpretation of fits and estimation.
2. Know how to draw production drawings (parts drawings with all representations from assembly drawing).
3. Practice linear, circular and angular geometrics and analyse the surface roughness of different process.
4. Practice to calibrate pressure gauges, temperature measurement devices, LVDT and strain measurement devices.
5. Practice to calibrate angular displacement, speed measurement and flow measurement devices.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VII Semester</b>		
<b>Code: 70P02</b>	<b>INTERNSHIP – III (Mini Project)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		<b>-</b>	<b>-</b>	<b>2</b>

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VIII Semester</b>		
<b>Code:70347</b>	<b>RENEWABLE ENERGY SOURCES (Professional Elective – V)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**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 tilted 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 09 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 09 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/](http://nptel.ac.in/courses/112105051/)
2. [https://www.vssut.ac.in/lecture\\_notes/lecture1428910296.pdf](https://www.vssut.ac.in/lecture_notes/lecture1428910296.pdf)
3. [faculty.itu.edu.tr/onbasiog11/DosyaGetir/62002](http://faculty.itu.edu.tr/onbasiog11/DosyaGetir/62002)
4. <https://www.journals.elsevier.com/renewable-energy/>
5. [www.ijrer.org](http://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

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VIII Semester</b>		
<b>Code: 70348</b>	<b>PROCESS PLANNING AND COST ESTIMATION (Professional Elective – V)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objectives:**

The objective of this subject is to provide knowledge of Planning and analyze the cost requirements of various production activities.

**MODULE I: Introduction to Process Planning 10 Periods**

Introduction- Methods of process planning - Drawing interpretation-Material evaluation – Steps in process selection - Production equipment and Tooling selection.

**MODULE II: Process Planning Activities 10 Periods**

Process parameters calculation for various production processes - Selection of jigs and fixtures Selection of quality assurance methods - Set of documents for process planning - Economics of process planning- case studies.

**MODULE III: Introduction to Cost Estimation 10 Periods**

A: Importance and Aims of costing and estimation – Difference between costing and estimation - methods of costing-Elements of cost estimation –Types of estimates.

B: Estimating procedure - Estimation of labour cost, Material cost - Allocation of overhead charges- Calculation of depreciation cost.

**MODULE IV: Production Cost Estimation 09 Periods**

Estimation of Different Types of Jobs - Estimation of Forging Shop, Estimation of Welding Shop and Gas Cutting - Estimation of Foundry Shop - Estimation of pattern cost and casting cost – Problems.

**MODULE V: Machining Time Calculation 09 Periods**

Estimation of Machining Time - Importance of Machine Time Calculation- Calculation of Machining Time - Different Lathe Operations, Drilling, Boring, Milling, Shaping, Planning and Grinding.

**TEXT BOOKS**

1. G.B.S.Narang and V.Kumar, "Production and Costing", Khanna Publishers, 1995.
2. R.Panneerselvam, P.Sivasankara "Process Planning and Cost estimation" Laxmi Publication, 2015.

**REFERENCES**

1. Russell.R.S and Taylor, B.W, "Operations Management", PHI, 6th Edition, 2009.
2. Chitale.A.V. and Gupta.R.C., "Product Design and Manufacturing", PHI, 2nd Edition, 2002.

3. Gideon Halevi and Roland Weill, “**Principles of Process Planning – A Logical Approach**” Chapman and Hall, London, 2014
4. S. K. Mukhopadhyay, “**Production Planning and Control-Text and cases**”, PHI Pvt. Ltd 2007.
5. Mikell.P.Groover “**Automation, Production Systems and Computer Integrated Manufacturing**”, Prentice Hall of India, New Delhi, 2008, 3<sup>rd</sup> edition.

#### **E - RESOURCES**

1. [nptel.ac.in/courses/112102103/Module%20G/Module%20G\(5\)/p4.htm](http://nptel.ac.in/courses/112102103/Module%20G/Module%20G(5)/p4.htm)
2. [nptel.ac.in/courses/106105087/pdf/m11L27.pdf](http://nptel.ac.in/courses/106105087/pdf/m11L27.pdf)
3. [www.engr.psu.edu/cim/ie550/ie550capp.ppt](http://www.engr.psu.edu/cim/ie550/ie550capp.ppt)

#### **Course Outcomes**

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

1. Relate the concepts of process planning and selection.
2. Maintain the various documents used in process planning.
3. Analyse various cost involved in a product and control it.
4. Make estimation for product.
5. Appraisal the costs and machining times for various manufacturing processes.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VIII Semester</b>		
<b>Code:70349</b>	<b>MECHATRONICS (Professional Elective – V)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objectives:**

The objectives of this course are to introduce students to Mechatronics systems, Solid state electronic devices, Hydraulic and pneumatic actuating systems, and Digital electronics and systems. The course is intended for students who are thinking about advanced studies in engineering.

**MODULE I: Introduction 10 Periods**

Definition – Trends - Control Methods: Standalone, PC Based (Real Time Operating Systems, Graphical User Interface, and Simulation) - Applications: SPM, Robot, CNC, FMS, CIM.

**MODULE II: Signal Conditioning & Electronic Interface Subsystems 10 Periods**

Signal Conditioning : A: Introduction – Hardware - Digital I/O, Analog input – ADC, resolution, speed channels Filtering Noise using passive components – Resistors, capacitors - Amplifying signals using OP amps –Software - Digital Signal Processing – Low pass, high pass, notch filtering.

Electronic Interface Subsystems : TTL, CMOS interfacing - Sensor interfacing – Actuator interfacing – solenoids, motors Isolation schemes- opto coupling, buffer IC's - Protection schemes – circuit breakers, over current sensing, resettable fuses, thermal dissipation - Power Supply - Bipolar transistors / mosfets.

**MODULE III : Precision Mechanical Systems & Electromechanical Drives 10 Periods**

A: Precision Mechanical Systems : Pneumatic Actuation Systems - Electro-pneumatic Actuation Systems - Hydraulic Actuation Systems - Electro-hydraulic Actuation Systems - Timing Belts – Ball Screw and Nut - Linear Motion Guides - Linear Bearings - Harmonic Transmission - Bearings- Motor / Drive Selection.

B: Electromechanical Drives: Relays and Solenoids - Stepper Motors - DC brushed motors – DC brushless motors - DC servo motors - 4-quadrant servo drives, PWM's - Pulse Width Modulation – Variable Frequency Drives, Vector Drives - Drive System load calculation.

**MODULE IV Microcontrollers Overview & PLC 09 Periods**

Microcontrollers Overview: 8051 Microcontroller, micro processor structure – Digital Interfacing - Analog Interfacing - Digital to Analog Convertors - Analog to Digital Convertors - Applications. Programming – Assembly, C (LED Blinking, Voltage measurement using ADC).

Programmable Logic Controllers: Basic Structure - Programming : Ladder diagram - Timers, Internal Relays and Counters - Shift Registers - Master and Jump Controls - Data Handling - Analog input / output - PLC Selection - Application.

## **MODULE V Programmable Motion Controllers**

**09 Periods**

Programmable Motion Controllers : Introduction - System Transfer Function – Laplace transform and its application in analyzing differential equation of a control system - feedback devices : Position, Velocity Sensors - Optical Incremental encoders - Proximity Sensors, Inductive, Capacitive, Infrared - Continuous and discrete processes - Control System Performance & tuning - Digital Controllers - P, PI , PID Control - Control modes – Position, Velocity and Torque - Velocity Profiles – Trapezoidal - S. Curve - Electronic Gearing - Controlled Velocity Profile - Multi axis Interpolation, PTP, Linear, Circular - Core functionalities – Home, Record position, Go to Position - Applications : SPM, Robotics.

### **TEXT BOOKS**

1. KP Ramachandran & GK Vijaya Raghavan, “**Mechatronics Integrated Mechanical Electronics Systems**”, WILEY India Edition, 2008 .
2. W Bolton, “**Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering**”, Pearson Education Press, 6th Edition, 2015.

### **REFERENCES**

1. N. Shanmugam, “**Mechatronics**”, Anuradha Agencies Publishers, 2009.
2. Devdasshetty Richard, “**Mechatronics System Design**”, Thomson, 2<sup>nd</sup> Edition, 2010.
3. M.D.Singh “**Mechatronics**”, J.G.Joshi, PHI.
4. W. Bolton, “**Mechatronics – Electronic Control Systems in Mechanical and Electrical Engg**”, 4<sup>th</sup> Edition, Pearson, 2012.
5. Godfrey C. Onwubolu, “**Mechatronics – Principles and Application**”, Elsevier, 2006.

### **E - RESOURCES**

1. <https://www.journals.elsevier.com/mechatronics>
2. <https://www.journals.elsevier.com/mechatronics/most-downloaded-article>
3. [www.sciencedirect.com/science/journal/09574158](http://www.sciencedirect.com/science/journal/09574158)
4. [https://en.wikipedia.org/wiki/List\\_of\\_engineering\\_journals\\_and\\_magazines](https://en.wikipedia.org/wiki/List_of_engineering_journals_and_magazines)
5. [www.servomagazine.com/index.php/magazine/article/ccs\\_mechatronics](http://www.servomagazine.com/index.php/magazine/article/ccs_mechatronics)
6. [nptel.ac.in/courses/112103174/](http://nptel.ac.in/courses/112103174/)
7. <https://www.btechguru.com/courses--nptel--mechanical-engineering--mechatronics-an..>

### **Course Outcomes**

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

1. Understand the electronic interface machines.
2. Recognize basic electronics terminology and basic sensors.
3. Understand mechanical, electro, pneumatic power driven system.
4. Study the architect of Microcontroller and PLC.
5. Understand various controllers and its application.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VIII Semester</b>		
<b>Code: 70350</b>	<b>MAINTENANCE AND SAFETY ENGINEERING (Professional Elective – VI)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objectives:**

The students will be able to get knowledge on types of maintenance, maintenance management, quality of maintenance, Reliability control in maintenance and safety engineering.

**MODULE I: Introduction, Principles and Practices of Maintenance 10 Periods**

Need for Maintenance, Facts and Figures, Modern Maintenance, Problem and Maintenance Strategy for the 21<sup>st</sup> century, Engineering Maintenance Objectives and Maintenance in Equipment Life Cycle, Terms and Definitions.

Reliability and machine availability – MTBF, MTRR and MWT – Factors of availability – Maintenance organization – Maintenance economics.

**MODULE II: Maintenance Management and Control & Types of Maintenance 10 Periods**

Maintenance Manual, Maintenance, Facility Evaluation, Functions of Effective Maintenance Management. Maintenance project control Methods, Maintenance Management Control Indices. Preventive maintenance, elements of preventive maintenance program, Establishing Preventive maintenance - Program, Program Evaluation and improvement, Measures Models. Corrective maintenance – types, steps and Downtime Components, measures Corrective maintenance models.

**MODULE III: Quality and Costing in Maintenance 10 Periods**

A: Quality: Needs for Quality Maintenance process, Maintenance work quality, Use of quality Control charts in Maintenance, work sampling, post maintenance testing, Reasons of Safety problems in Maintenance, Guidelines to improve safety in Maintenance work, Safety Officer's Role in Maintenance Work, protection of Maintenance workers.

B: Maintenance Costing: Reasons for Maintenance costing, Maintenance Budget preparation Methods and Steps, Maintenance Labor cost estimation; Material cost Estimation, Equipment Life Cycle Maintenance Cost Estimation, Maintenance Cost Estimation Models.

**MODULE IV: Reliability, Reliability Controlled Maintenance & Maintainability 09 Periods**

Goals and principles, RCM process and Associated Questions, RCM program Components Effectiveness Measurement Indicators. RCM Benefits and Reasons for its Failures. Reliability Versus Maintenance and Reliability in support Phase. Bathtub Hazard Rate Concept, Reliability Measures and Formulas Reliability Networks, Reliability analysis Techniques.

Maintainability Importance and Objective Maintainability in Systems Life Cycle, Maintainability Design Characteristics, Maintainability Functions and Measures, Common Maintainability Design Errors.

## **MODULE V: Safety Engineering and Accidents**

**09 Periods**

Evolution of modern safety concept- safety policy - Safety Organization - Safety Committee - budgeting for safety. Safety training – creating awareness, awards, celebrations, safety posters, safety displays, safety pledge, safety incentive scheme, safety campaign.

Concept of an accident, reportable and non reportable accidents, reporting to statutory authorities – principles of accident prevention – accident investigation and analysis – records for accidents, departmental accident reports, documentation of accidents – unsafe act and condition – supervisory role – cost of accident. Overview of factories act 1948 – OHSAS-18000.

### **TEXT BOOKS**

1. Dr. A.K.Guptha, “**Reliability, Maintenance and Safety Engineering**”, University Science Press, 2009.
2. L.M. Deshmukh, “**Industrial Safety Management- Hazard Identification and Risk Control**”, Tata McGraw-Hill Company, 2005.

### **REFERENCES**

1. R.C.Mishra and K.Pathak- **Maintenance Engineering & Management**”, PHI Publications, Second edition, 2012.
2. Elsayed A. Elsayed, “**Reliability Engineering**”, Wiley Publications, Second edition, 2012.
3. B.S.Dhillon - **Engineering Maintenance a Modern Approach**”, C.R.C. Press, 2002
4. “**Accident Prevention Manual for Industrial Operations**”, National Safety Council, Chicago, 1982
5. Heinrich H.W, “**Industrial Accident Prevention**”, Tata McGraw-Hill Company, New York, 1980.

### **E - RESOURCES**

1. <http://www.emeraldinsight.com/journal/jqme>
2. <https://www.elsevier.com/social-sciences/elsevier-safety-journals>
3. <http://www.powershow.com>
4. <http://www.citehr.com/482897-industrial-safety>

### **Course Outcomes**

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

1. Know the principles and practices of maintenance.
2. Understand the Maintenance Management and Control & Types of Maintenance.
3. Know the quality and cost involved in Maintenance.
4. Understand the Reliability, Reliability controlled Maintenance, Maintainability.
5. Get the awareness of Safety Engineering and Accidents.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VIII Semester</b>		
<b>Code: 70351</b>	<b>TOTAL QUALITY MANAGEMENT (Professional Elective – VI)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**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. Besterfield, "**Total Quality Management**", 3<sup>rd</sup>, 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](https://src.alionscience.com/pdf/RAC-1ST/SOAR7_1st_Chapter.pdf)
2. [https://onlinecourses.nptel.ac.in/noc17\\_mg18](https://onlinecourses.nptel.ac.in/noc17_mg18)
3. [nptel.ac.in/courses/122106032/Pdf/4\\_2.pdf](https://nptel.ac.in/courses/122106032/Pdf/4_2.pdf)
4. [www.thecqi.org](http://www.thecqi.org)
5. [www.emeraldinsight.com/journal/tqm](http://www.emeraldinsight.com/journal/tqm)
6. [www.emeraldinsight.com/doi/pdf/10.1108/09544789710367712](http://www.emeraldinsight.com/doi/pdf/10.1108/09544789710367712)
7. [www.statit.com/statitcustomqc/StatitCustomQC\\_Overview.pdf](http://www.statit.com/statitcustomqc/StatitCustomQC_Overview.pdf)

## **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.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VIII Semester</b>		
<b>Code:70352</b>	<b>PRODUCTION PLANNING AND CONTROL (Professional Elective – VI)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objectives:**

The objective of this subject is to provide knowledge of Planning, Scheduling and Various production activities of an Industry.

**MODULE I: Introduction 10 Periods**

Production Planning and Control - Definition, Objectives, Functions, Elements. Types of production, Organization of production planning and control department – Internal organization of department.

**MODULE II: Forecasting 10 Periods**

Importance of forecasting – Types of forecasting, uses – General principles of forecasting – Forecasting techniques – Qualitative methods and Quantitative methods.

**MODULE III: Inventory Management & Inventory Control Systems 10 Periods**

A: Inventory management: Functions of inventories – Relevant inventory costs – ABC analysis – VED analysis – EOQ, EPQ model.

B: Inventory control systems: P-Systems and Q-Systems, Introduction to MRP & ERP, LOB (Line of Balance), JIT inventory.

**MODULE IV: Routing & Scheduling 09 Periods**

Routing: Definition – Routing procedure –Route sheets – Bill of material – Factors affecting routing procedure. Scheduling –Definition, Scheduling Policies, Techniques, Standard Scheduling Methods.

**MODULE V: Line Balancing & Dispatching 09 Periods**

Line Balancing, Aggregate planning, Chase planning, Expediting, Controlling aspects. Dispatching – Activities of dispatcher – Dispatching procedure – Follow-up – Definition – Reason for existence of functions – Types of follow-up. Applications of computer in production planning and control.

**TEXT BOOKS**

1. Baffa & Rakesh Sarin “**Modern Production and operation managements**”, John Wiley, 8th edition, 2007.
2. Samuel Eilon “**Elements of Production Planning and Control**”, Macmillan Publishers, 1962.

## REFERENCES

1. S.N. Chary “**Operations Management**”, TMH, 3rd edition, 2012.
2. Martin K. Starr and David W. Miller “**Inventory Control Theory and Practice**”, Prentice-Hall Publishers.
3. John E. Biegel “**Production Control A Quantitative Approach**”, Prentice-Hall, 1980.
4. Moore “**Production Control**”, McGraw-Hill Publishers.
5. Joseph Monks “**Operations Management**”, McGraw-Hill, 2nd edition, 1982.

## E - RESOURCES

1. <http://www.ijret.org>
2. [www.springer.com](http://www.springer.com)
3. <https://www.journals.elsevier.com/journal-of-manufacturing-systems/recent-articles>
4. <https://pdfs.semanticscholar.org>

## Course outcomes

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

1. Understand elements of production control.
2. Analyze the forecasts in the manufacturing and service sectors using selected quantitative and qualitative techniques.
3. Understand and analyze various inventory techniques.
4. Solve routing and scheduling problems.
5. Get the knowledge of line balancing and dispatching and applications of computer in PPC.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B. Tech VIII Semester</b>		
<b>Code:70P03</b>	<b>ENTREPRENEURSHIP</b> (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 1</b>		<b>-</b>	<b>2</b>	<b>-</b>

**Prerequisites: NIL**

**Course Objective:**

The aim of this course is to inspire students to become entrepreneurs so that they will emerge as job providers rather than job seekers.

**MODULE I: Entrepreneurship**

**6 Periods**

Entrepreneurship: Concept, knowledge and skills requirement; characteristic of successful entrepreneurs; entrepreneurship process; factors impacting emergence of entrepreneurship; Differences between Entrepreneur and Intrapreneur, Understanding individual Entrepreneurial Mindset and personality, recent trends in entrepreneurship.

**MODULE II: Starting the New Venture**

**6 Periods**

Starting the venture: generating business idea – sources of new ideas, methods of generating ideas, creative problem solving, opportunity recognition; environmental scanning, competitor and industry analysis;

Feasibility study – market feasibility, technical/operational feasibility, financial feasibility; drawing business plan; preparing project report; presenting business plan to investors.

**MODULE III: Sources of Finance and Entrepreneurship Programs**

**8 Periods**

A: Sources of finance: Various sources of Finance available: Long term sources Short term sources- Institutional Finance – commercial Banks, SFC's in India - NBFC's in India - their way of financing in India for small and medium business.

B: Entrepreneurship development programs in India: The entrepreneurial journey- Institutions in aid of entrepreneurship development: MDI, NIESBUD, EDII, IED. EDP's of SIDBI.

**MODULE IV: Entrepreneurship Development and Women Entrepreneurship**

**6 Periods**

Entrepreneurship Development and Government: Role of Central Government and State Government in promoting Entrepreneurship - Introduction to various incentives, subsidies and grants - Export Oriented Units - Fiscal and Tax concessions available..

Women entrepreneurship: Role and Importance, Growth of women entrepreneurship in India, Issues & challenges - Entrepreneurial motivations.

**MODULE V: Entrepreneurship - Law and Strategy**

**6 Periods**

Entrepreneurship and Law: Intellectual property Rights-Patents, Copyrights-Trademarks and Trade secrets- Licensing- franchising, Legal issues and challenges of new venture startups.

Strategic perspectives in entrepreneurship: Strategic planning-Strategic actions- strategic positioning- Business stabilization- Building the adaptive firms-Understanding the growth stage-Unique managerial concern of growing ventures.

**TEXT BOOKS:**

1. D F Kuratko and T V Rao, Entrepreneurship - A South-Asian Perspective - Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit : [login.cengage.com](http://login.cengage.com)).

**REFERENCES:**

1. Vasant Desai —Small Scale industries and entrepreneurship| Himalaya publishing 2012.
2. Rajeev Roy —Entrepreneurship| 2e, Oxford, 2012.
3. B.Janakiramand M.Rizwanal| Entrepreneurship Development: Text & Cases, Excel Books, 2011.
4. Stuart Read, Effectual Entrepreneurship, Routledge, 2013.
5. Nandan H, Fundamentals of Entrepreneurship, PHI, 2013

**E-RESOURCES:**

1. [http://freevideolectures.com/Course/3641/Entrepreneurship-Through-the-Lens-of-Venture Capital](http://freevideolectures.com/Course/3641/Entrepreneurship-Through-the-Lens-of-Venture-Capital)
2. <http://www.onlinevideolecture.com/?course=mba-programs&subject=entrepreneurship>
3. [http://nptel.ac.in/courses/122106032/Pdf/7\\_4.pdf](http://nptel.ac.in/courses/122106032/Pdf/7_4.pdf)
4. <https://www.scribd.com/doc/21516826/Entrepreneurship-Notes>
5. <http://freevideolectures.com/Course/3514/Economics--Management--Entrepreneurship/50>

**Course Outcomes:**

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

1. Understand the concept of entrepreneurship and challenges in the world of competition.
2. Understands the process of launching a new venture.
3. Understand the sources of finance and also the various entrepreneurship development programmes.
4. Understand the role of government in the development of Entrepreneurship and also gain the knowledge of women entrepreneurship.
5. Understand the legal aspects of entrepreneurship and also the Strategic perspectives of Entrepreneurship.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VIII Semester</b>		
<b>Code:70P04</b>	<b>COMPREHENSIVE VIVA VOCE</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 2</b>		<b>-</b>	<b>-</b>	<b>4</b>

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VIII Semester</b>		
<b>Code:70P05</b>	<b>MAJOR PROJECT</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 12</b>		<b>-</b>	<b>-</b>	<b>18</b>

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech. VIII Semester</b>		
<b>Code:70A06</b>	<b>FINE ARTS / FOREIGN LANGUAGE (Common for CE, EEE, ME, ECE, CSE, IT and Min.E)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: Nil</b>		<b>-</b>	<b>2</b>	<b>-</b>

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70132</b>	<b>AIR POLLUTION AND CONTROL (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>3</b>	<b>2</b>	<b>-</b>

**Prerequisite:** Nil

**Course Objectives:** This course provides the knowledge and understanding of the problems associated with air pollution indoor and outdoor. It also describes the regulations pertinent to air pollution especially due to industries making the student to design proper air pollution control devices.

**MODULE I: Air Pollution**

**13 Periods**

Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non- Point, Line and Areal Sources of air pollution-stationary and mobile sources. Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc., ambient air quality standards.

**MODULE II: Thermodynamics and Kinetics of Air-Pollution**

**13 Periods**

Applications in the removal of gases like SO<sub>x</sub>, NO<sub>x</sub>, CO, HC etc., air-fuel ratio, Computation and Control of products of combustion.

**MODULE III: Meteorological Parameters and Wind Behavior**

**12 Periods**

**A: Meteorology** Properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams, Lapse Rates, Pressure Systems.

**B: Plume Dispersion** Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

**MODULE IV: Control of Particulates**

**13 periods**

Control at Sources, Process Changes, Equipment modifications, Design and operation of control equipments – Settling Chambers, Centrifugal separators, Filters, Dry and Wet scrubbers, Electrostatic precipitators.

**MODULE V: General Methods of Control of NO<sub>x</sub> and SO<sub>x</sub> Emissions**

**13 periods**

In-plant Control Measures, process changes, dry and wet methods of removal and recycling. Air Quality Management – Monitoring of SPM, SO, NO and CO Emission Standards.

**TEXT BOOKS:**

1. M.N.Rao and H.V.N.Rao, “**Air pollution**”, Tata Mc.Graw Hill Company, 26<sup>th</sup> reprint 2007.
2. R.K. Trivedy and P.K. Goel, “**An introduction to Air pollution**”, B.S. Publications, 2<sup>nd</sup> revised edition, 2005.

**REFERENCES:**

1. Daniel Vallero, “**Air Pollution Control: A Design Approach**” Academic Press, 5<sup>th</sup> Edition, 2014.
2. Karl B. Schnelle, Jr., Russell F. Dunn, Mary Ellen Ternes, “**Air Pollution Control Technology Handbook**”, CRC Press, 2<sup>nd</sup> Edition, 2015.
3. Thad Godish, Wayne T. Davis, Joshua S. Fu, “**Air Quality**”, CRC Press, 5<sup>th</sup> Edition, 2014.
4. Kenneth C. Schiffner, “**Air Pollution Control Equipment Selection Guide**”, CRC Press, 2<sup>nd</sup> edition, 2013.
5. Marco Ragazzi, “**Air Quality: Monitoring, Measuring, and Modeling Environmental Hazards**”, Apple Academic Press, 1<sup>st</sup> edition, 2016.

**E RESOURCES:**

1. <http://www3.cec.org/islandora/en/item/2195-best-available-technology-air-pollution-control-en.pdf>.
2. <http://www.eolss.net/sample-chapters/c09/e4-11-05.pdf>.
3. <https://www.env.go.jp/earth/coop/coop/document/01-apctme/contents.html>.

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

1. Identify different sources of air pollution and the effects on human and environment.
2. Gain knowledge in computation of air pollutant removal of gases like SO<sub>x</sub>, NO<sub>x</sub>, CO etc.
3. Understand the importance of meteorological parameters like wind, pressure, humidity in dispersing air pollutants.
4. Gain knowledge in designing and operating particulate air control equipment.
5. Acquire the knowledge in designing the control system for gaseous air pollutants.

## **OPEN ELECTIVES**

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70241</b>	<b>ELECTRICAL SAFETY AND ENERGY MANAGEMENT (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>3</b>	<b>2</b>	<b>-</b>

**Prerequisite:** 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 13 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.

**INSTALLATION AND EARTHING OF EQUIPMENTS 13 Periods**

**MODULE II:**

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 12 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 13 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 13 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.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70355</b>	<b>INDUSTRIAL SAFETY (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>3</b>	<b>2</b>	<b>-</b>

**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**

**13 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**

**13Periods**

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**

**12 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**

**13 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**

**13 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](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](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 should 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.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70446</b>	<b>PRINCIPLES OF COMMUNICATION ENGINEERING (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>3</b>	<b>2</b>	<b>-</b>

**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 16 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 12 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 12 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 12 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 12 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, Pearson Education, 2007.
2. Simon Haykin, “**Communication Systems**”, 4<sup>th</sup> Edition, John Wiley & Sons, 2001.

### **REFERENCE BOOKS:**

1. H.Taub,DL Schilling,G Saha,“**Principles of Communication**”, 3<sup>rd</sup> Edition, 2007.
2. B.P.Lathi,“**Modern Analog And Digital Communication systems**”, Oxford University Press, 3<sup>rd</sup> Edition, 2007.
3. Blake, “**Electronic Communication Systems**”, Thomson Delmar Publications, 2002.
4. Martin S.Roden, “**Analog and Digital Communication System**”, PHI, 3<sup>rd</sup> Edition, 2002.
5. B. Sklar, “**Digital Communication Fundamentals and Applications**”, Pearson Education, 2<sup>nd</sup> 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. Notes on Digital Communication -  
<https://www.cl.cam.ac.uk/teaching/0708/DigiCommI/dc1.pdf>
4. <https://www.britannica.com/technology/satellite-communication>
5. [http://www.radio-electronics.com/info/satellite/communications\\_satellite/satellite-communications-basics-tutorial.php](http://www.radio-electronics.com/info/satellite/communications_satellite/satellite-communications-basics-tutorial.php)
6. <http://nptel.ac.in/courses/117105131/>
7. <http://nptel.ac.in/courses/117104127/>

### **Course Outcomes:**

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

1. Understand fundamentals of analog communications.
2. Classify different band-pass modulation schemes.
3. Categorize the different base-band modulation schemes.
4. Examine spread spectrum techniques and multiple access mechanisms.
5. Get basic knowledge on satellite and optical communications.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70537</b>	<b>SOFTWARE QUALITY ASSURANCE AND TESTING (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>3</b>	<b>2</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objectives:** This course will enable students to learn and understand the importance of standards in the quality management process and their impact on the final product, identify, implement and analyze software quality metrics, learn how to plan a software testing strategy and methodology and to gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects.

**MODULE I: Software Quality Assurance Framework and Standards** **12 Periods**

SQA Framework - Definition of Quality, Software Quality Assurance, Components of Software Quality Assurance, Software Quality Assurance Plan: Steps to develop and implement a Software Quality Assurance Plan.

Quality Standards - ISO 9000 and Companion ISO Standards, CMM, CMMI, PCMM, Malcom Balridge, 3 Sigma, 6 Sigma.

**MODULE II: SQA Metrics and Methodologies** **13 Periods**

Software Quality Assurance Metrics - Software Quality Metrics, product Quality metrics, In-Process Quality Metrics, Metrics for Software Maintenance, Examples of Metric Programs.

Software Quality metrics methodologies - Establish quality requirements, Identify Software quality metrics, implement the software quality metrics, analyze software metrics results, validate the software quality metrics.

**MODULE III: Software Testing Strategy and Environment Establishing** **13 Periods**

A: Software Testing Strategy and Environment Establishing - Testing policy, structured approach to testing, test factors, Economics of System Development Life Cycle (SDLC) Testing.

B: Software Testing Methodology - Defects hard to find, verification and validation, functional and structural testing, workbench concept, eight considerations in developing testing methodologies, testing tactics checklist.

**MODULE IV: Software Testing Techniques & Tools** **13 Periods**

Software Testing Techniques - Black-Box, Boundary value, Bottom-up, Branch coverage, Cause-Effect graphing, CRUD, Database, Exception, Gray-Box, Histograms, Inspections, JADs, Pareto Analysis, Prototyping, Random Testing, Risk-based Testing, Regression Testing, Structured Walkthroughs, Thread Testing, Performance Testing, White-Box Testing.

Software Testing Tools - Taxonomy of testing tools, Methodology to evaluate automated testing tools, Load Runner, Win runner and Rational Testing Tools, Java Testing Tools, JMetra, JUNIT and Cactus.

**MODULE V: Testing Process and Applications** **13 Periods**

Testing Process - Eleven Step Testing Process: Assess Project Management Development Estimate and Status, Develop Test Plan, Requirements Phase Testing, Design Phase Testing, Program Phase

Testing, Execute Test and Record Results, Acceptance Test, Report test results, testing software installation, Test software changes.

Testing Applications - Evaluate Test Effectiveness, Testing Specialized Systems and Applications  
Testing Client/Server, Web applications, Testing off the Shelf Components, Testing Security,  
Testing a Data Warehouse.

### **TEXTBOOKS**

1. William E.Lewis, “**Software Testing and Continuous Quality Improvement**”, Technical Press, 3<sup>rd</sup> Edition, 2010.
2. Stephen H.Kan, “**Metrics and Models in Software Quality Engineering**”, 2<sup>nd</sup> Edition, Addison-Wesley Professional, 2003.

### **REFERENCES**

1. William E. Perry, “**Effective Methods for Software Testing**”, 3<sup>rd</sup> Edition, Published by Wiley & Sons, 2006.
2. Dr.K.V.K.K. Prasad, “**Software Testing Tools**”, Dream Tech Publishers, 3<sup>rd</sup> Edition, 2009.

### **E-RESOURCES**

1. <https://tienhuong.files.wordpress.com/2009/08/software-testing-and-continuous-quality-improvement-second-edition.pdf>
2. <https://hientl.files.wordpress.com/2011/12/effective-methods-for-software-testing2.pdf>
3. [http://ndl.iitkgp.ac.in/document/zyMnqgZQXCJME6wgSqrU87VCGcelOw5mZ-ybmrhKBj79VQPP0\\_ZQHLqcOopPDoaFWhZybCrPg\\_joTbBU8ZpGA](http://ndl.iitkgp.ac.in/document/zyMnqgZQXCJME6wgSqrU87VCGcelOw5mZ-ybmrhKBj79VQPP0_ZQHLqcOopPDoaFWhZybCrPg_joTbBU8ZpGA)
4. <http://nptel.ac.in/courses/106101061/18>

### **Course Outcomes:**

On the successful completion of the course, a student will be able to:

1. Define Software Quality Assurance Framework and Standards
2. Outline various Metrics, Methodologies for Measuring SQA.
3. Classify the Software Testing Strategy and Associate it with the Test Environment.
4. Select a Specific Testing Technique and Tool for Software Development.
5. Apply the Test Process on various Software Domains.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code:70619</b>	<b>INFORMATION RETRIEVAL SYSTEMS (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>3</b>	<b>2</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objectives:**

This course enables the students to study the fundamentals of DBMS, Data warehouse and Digital libraries, various preprocessing techniques, indexing approaches, various clustering approaches and study different similarity measures. It explores cognitive approaches and search techniques and identifies retrieval techniques in multimedia information systems and query languages.

**MODULE I: Information Retrieval Systems and Capabilities** **13 Periods**

Introduction- Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries.  
Capabilities- Data Warehouses, Information Retrieval System Capabilities, Search capabilities, Browse capabilities, Miscellaneous capabilities.

**MODULE II: Cataloging and Indexing** **13 Periods**

Cataloging - Objectives, Indexing Process, Automatic Indexing, Information Extraction, Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.  
Indexing- Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages.

**MODULE III: Clustering and Search Techniques** **12 Periods**

A: Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.  
B: User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems, Searching the Internet and hypertext.

**MODULE IV: Visualization and Evaluation** **13 Periods**

Information Visualization- Introduction, Cognition and perception, Information visualization technologies, Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems.  
Information System Evaluation- Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.

**MODULE V: Retrieval Techniques and Libraries** **13 Periods**

Multimedia Information Retrieval- Multimedia Information Retrieval, Models and Languages, Data Modeling, Query Languages, Indexing and Searching.  
Digital Libraries- Libraries and Bibliographical systems, online IR system, OPACs, Digital Libraries.

### **TEXT BOOKS:**

1. Kowalski, Gerald J. Maybury, Mark T, “**Information Storage and Retrieval systems Theory and Implementation**”, 2<sup>nd</sup> Edition, 2000.
2. Ricardo Baeza-Yate, “**Modern Information Retrieval**”, Pearson Education, 2007.

### **REFERENCES:**

1. David A Grossman and Ophir Frider, “**Information Retrieval: Algorithms and Heuristics**”, 2<sup>nd</sup> Edition, Springer.
2. Frakes, W.B., Ricardo Baeza-Yates, “**Information Retrieval Data Structures and Algorithms**”, Prentice Hall, 1992.

### **E -RESOURCES**

1. <https://books.google.co.in/books?id=v8CyvsKPdhsC&printsec=frontcover&dq=Kowalski,+Gerald+j.Maybury,+Mark+T,+%E2%80%9CInformation+Storage+and+Retrieval+systems+Theory+and+Implementation%22,+2nd+Edition,+2000.&hl=en&sa=X&ved=0ahUKEwiw6PGwmNjTAhWLu48KHxNVAJsQ6AEIITAA#v=onepage&q=Kowalski%20Gerald%20j.Maybury%20Mark%20T%20%E2%80%9CInformation%20Storage%20and%20Retrieval%20systems%20Theory%20and%20Implementation%22%202nd%20Edition%202000.&df=false>.
2. <https://books.google.co.in/books?id=nsjla44zAfwC&printsec=frontcover&dq=Ricardo+Baeza+Yates,+%E2%80%9CModern+Information+Retrieval%E2%80%9D,+Pearson+Education,+2007&hl=en&sa=X&ved=0ahUKEwjUrLyymdjTAhWJrY8KHeQCAygQ6AEILDAB#v=onepage&q&df=false>
3. [www.sciencedirect.com/science/article/pii/S1877050916000739](http://www.sciencedirect.com/science/article/pii/S1877050916000739)
4. [cs.uci.ac.cy/courses/EPL660/lectures.html](http://cs.uci.ac.cy/courses/EPL660/lectures.html)

### **Course Outcomes:**

On the successful completion of the course, a student will be able to:

1. Recognize the Boolean Model, Vector Space Model, and Probabilistic Model.
2. Explore the indexing techniques.
3. Apply clustering techniques.
4. Examine visualization technologies and system evaluation methods.
5. Classify Information Retrieval utilities.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B. Tech</b>		
<b>Code: 72501</b>	<b>INTRODUCTION TO MINING ENGINEERING (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>3</b>	<b>2</b>	<b>-</b>

**Prerequisites: Nil**

**Course Objectives:**

To demonstrate the importance of mining in national economy, understand the terminology associated with the discipline and be familiar with the available regulatory mechanism to enable safe & sustainable mining operations. To know the history of mining and describe the correlation between the development of mining and cultural progress. To introduce the field of mining and provide basic input about mining unit operations. To learn the various modes of access and study the methods of designing the access.

**MODULE-I: Introduction to mining engineering and Opening up of deposits 13 Periods**

Introduction to mining engineering: Significance to mining industry in national economy and infrastructure building, basic mining terminologies, stages in mine life cycle, geo-technical investigations, classification of mining methods and their selection criteria. Opening up of deposits: Types, size and location of entries into underground coal and other minerals.

**MODULE-II: Shaft sinking operation 13 Periods**

Preliminary geo-technical investigations for a shaft sinking, surface arrangements for sinking shafts and equipment. Methods of sinking shaft in water-logged, pressurized strata in loose and running soils. Mechanized shaft sinking, shaft borers and drop raise method. Need for widening and deepening of operating shafts. Different methods for widening and deepening shafts.

**MODULE-III: Development of Workings 12 Periods**

A: Drivage of cross cuts, drifts, inclines and raises by conventional and mechanized methods. Calculation of OMS.

B: Arrangements for ventilations, supports, lightings, transportations and drainages. Drilling patterns for underground coal mines and hard rock mines.

**MODULE-IV: Mine Supports 13 Periods**

Mine supports: Types of support: timber, prop, chock/cog, cross bar, concrete, steel and hydraulic supports. Yielding and rigid supports. Fore poling, roof stitching, roof bolting, applicability, advantages and limitations of various supports, Systematic support rule.

## **MODULE-V: Tunneling Methods**

**13 Periods**

Conventional method: drilling and blasting method, types of drill patterns, blasting and transportation of muck.

Mechanized method: construction and working principle of tunnel boring machine, applicability, advantages and limitations of tunnel boring machine.

Shield tunneling method: construction and working principle, applicability, advantages and limitations.

### **TEXT BOOKS:**

1. Howard L.Hartman, Jan M.Mutmansky, “**Introductory mining engineering**”, wiley India (P) Ltd.
2. D.J. Deshmukh , “**Elements of mining technology**”, Vol-I, Denett & Company .

### **REFERENCE BOOKS:**

1. Roy Piyush Pal, “**Blasting in ground excavations and mines**”, Oxford and IBH, 1<sup>st</sup> edition, 1993.
2. C.P. Chugh, “**Drilling technology handbook**”, Oxford and IBH, 1<sup>st</sup> edition, 1977.

### **E RESOURCES:**

1. <https://www.nap.edu/read/10318/chapter/5#23>
2. <http://www.alta.eu/commodities/mining-technology/surface-mining/long-distance-belt-conveyors/>

### **Course Outcomes:**

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

1. Know the status and significance of mining Industry
2. Know about different methods of Shaft sinking operations
3. Know about Development workings
4. Know about different types of supports, their advantages and disadvantages
5. Know about different tunneling methods.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech</b>		
<b>Code: 7B159</b>	<b>TRAINING AND ORGANISATIONAL DEVELOPMENT (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>3</b>	<b>2</b>	<b>-</b>

**PREREQUISITES: NIL**

**COURSE OBJECTIVE:**

To enable the students to understand the design of training, implementation and evaluation of training programs in the organization.

**MODULE I: Training in organizations**

**14 Periods**

**Introduction to training:** Trends in training, Career opportunities in training, important concepts and meanings, Integrating OD.

**Strategy and training,** understand motivation and performance, aligning training design with learning process.

**MODULE II: Training Need analysis**

**12 Periods**

**Need Analysis and Training design:** The Training Need Analysis (TNA) Model, TNA and Design, organizational constraints.

**Developing objectives,** Facilitation of learning and training transfer to the job, design theory.

**MODULE III: Training methods**

**12 Periods**

**A: Introduction to methods of training:** Matching methods with outcomes, lectures and demonstrations, games and simulations.

**B: Onjob Training,** computer based training (CBT).

**MODULE – IV: Implementation & Evaluation of Training**

**12 Periods**

**Development of training,** implementation, transfer of training, major players in training & development.

**Rational for evaluation,** resistance to training evaluation, types of evaluation.

**MODULE V: Organization Development**

**14 Periods**

Organisational development- An introduction: Organisational Development – Meaning and Definition, History of OD, Relevance of Organisational Development for Managers, Characteristics of OD, Assumptions of OD.

Change Process and Models: Organisational Change, Strategies for Change, Theories of Planned Change (Lewin’s change model, Action research model, the positive model), Action Research as a Process, Resistance to Change.

**TEXT BOOKS:**

1. Anjali Ghansekar “**Training & Development**” Everest, 2013.
2. G Pandu Naik “**Training & Development**” Excel Books, 2012.

**REFERENCE BOOKS:**

1. P.Nick Blanchard, James W. Thacker, A.Anand Ram, “**Effective Training 4e**”, Pearson, 2012.
2. B,Rathan Reddy “ **Effective Human Resource Training & Developing Strategy**” Himalaya,2012.
3. Rolf Lynton, Uday Pareek “**Training for Development**” Sage, 2012.
4. P L Rao : HRD Trainer's Handbook of Management Games, Excel, 2013.
5. Pepper, Allan D, “**Managing the Organisational Development function**”, Aldershot, Gower, 1984.

**E RESOURCES:**

1. <https://hr.unm.edu/employee-and-organizational-development>
2. <http://managementhelp.org/organizationalchange/>
3. <https://ww2.mc.vanderbilt.edu/vmgtod/>
4. <http://nptel.ac.in/courses/122105020/9>
5. <http://nptel.ac.in/courses/122105020/18>

**Journals :** Vikalpa, IIMA, IIMB Review, Decision, IIMC, Vision, HBR.

**Course Outcomes:**

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

1. Understand the basic concepts of training and development in an organization.
2. Design a training programme with the knowledge of need analysis.
3. Know about the various training methods that are used in organizations.
4. Know the process of implementation and evaluation of training methods.
5. Gain knowledge of various areas of organizational training.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B. Tech.</b>		
<b>Code: 70H07</b>	<b>ENGLISH LANGUAGE SKILLS (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>3</b>	<b>2</b>	<b>-</b>

**Prerequisite:** Nil

**Course Objective:** 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.

**Introduction:**

Effective communication and interpersonal skills are crucial to increase employment opportunities and to compete successfully in the Global market. The real key to the effectiveness of professionals is their ability to put their domain knowledge into effective practice. Every employer today, looks for an extra edge in their employees. The rapid change in the corporate world asks for proper communication skills in almost all kinds of fields. This course is designed to enhance overall communication skills and soft skills amongst the learners including "How to win interviews". The course content for Business Communication and Soft Skills has been developed keeping in mind the standard of Indian students and the industry requirements.

**MODULE I: Communication Skills**

**13 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**

**13 Periods**

Informal and Formal conversation, Verbal and Non - verbal communication. Barriers to effective communication - Kinesics

**MODULE III: Reading Skills**

**13 Periods**

Types of reading-reading for facts, guessing meaning from context, strategies of reading- scanning, skimming, inferring meaning, critical reading.

**MODULE IV: Writing and Composition**

**13 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

12 Periods

Characteristics of writing – mechanics of writing – methodology of writing – format & style-structures of writing – circular writing – memo writing – instructions writing, Report Writing.

### REFERENCE BOOKS:

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. <http://www.journals.aiac.org.au/index.php/IJALEL/article/view/2471> (Writing Skills)
7. [https://www.youtube.com/watch?v=cQruENyLNYI&list=PLbMVogVj5nJSZB8BV29\\_sPwwkzMTYXpaH](https://www.youtube.com/watch?v=cQruENyLNYI&list=PLbMVogVj5nJSZB8BV29_sPwwkzMTYXpaH) (Communication Skills)
8. [https://www.youtube.com/watch?v=p1-etClsXdk&index=5&list=PLbMVogVj5nJSZB8BV29\\_sPwwkzMTYXpaH](https://www.youtube.com/watch?v=p1-etClsXdk&index=5&list=PLbMVogVj5nJSZB8BV29_sPwwkzMTYXpaH) (Conversation 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.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70B15</b>	<b>TRANSFORM TECHNIQUES (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>3</b>	<b>2</b>	<b>-</b>

**Pre-requisite:** Nil

**Course Objective:** The objective of this course is to familiarize the prospective engineers with techniques in multivariate analysis, some useful special functions. It deals with acquainting the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their profession.

**MODULE I: Fourier series**

**13 Periods**

Determination of Fourier coefficients, Fourier series, even and odd functions, Half range Fourier sine and cosine expansions. Fourier series in an arbitrary interval - Fourier series for even and odd periodic functions, Half range Fourier sine and cosine expansions.

**MODULE II: Fourier Transforms:**

**13 Periods**

Fourier integral theorem - Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – properties – inverse transforms - Finite Fourier transforms – Parseval’s Identity.

**MODULE III: Z-transforms**

**12 Periods**

A: Introduction: Definition, Region of convergence, Linearity property, Damping rule, shifting theorems multiplication theorem, initial value theorem, final value theorem.

B: Inverse z-transforms: power series method, partial fraction method, convolution theorem. Application of z-transforms: difference equations.

**MODULE IV: Applications of Single Variable & Curve tracing**

**13 Periods**

**Applications of Single Variable** Radius, centre and circle of curvature , Evolutes – Envelopes.

Curve tracing in Cartesian, Polar and parametric co-ordinates.

**MODULE V: Series Solution of ODE & Integration applications:**

**13 Periods**

**Series Solution of ODE:** 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.

**Integration applications:** Riemann sums, Integral representation for lengths – areas – volumes & surface areas in Cartesian and polar coordinates

**TEXT BOOKS:**

1. Kreyszig “**Advanced engineering Mathematics**” John Wiley & Sons, 10<sup>th</sup> Edition, 2010.
2. B.S. Grewal “**Higher Engineering Mathematics**” Khanna Publishers, 43<sup>rd</sup> Edition, 2014.

**REFERENCE:**

1. R.K. Jain & S.R.K. Iyengar “**Advanced Engineering Mathematics**” Narosa Publications, 4th edition 2014.
2. Dr.M.D. Raisinghanian “ **Ordinary and Partial differential Equations** ” S. Chand , 18<sup>th</sup> Edition
3. Tom M Apostle “**Calculus – Volume-I & II**”, 2<sup>nd</sup> Edition, Wiley Publications.

**E-RESOURCES**

1. <https://see.stanford.edu/materials/lsoftae261/book-fall-07.pdf>
2. [http://www.gnindia.dronacharya.info/ECE2Dept/Downloads/question\\_papers/ISem/Engg-Maths1/UNIT-1/Curve-tracing.pdf](http://www.gnindia.dronacharya.info/ECE2Dept/Downloads/question_papers/ISem/Engg-Maths1/UNIT-1/Curve-tracing.pdf)
3. [http://ask.fxplus.ac.uk/tools/HELM/pages/workbooks\\_1\\_50\\_jan2008/Workbook21/21\\_4\\_eng\\_ap\\_p\\_z\\_trnsfms.pdf](http://ask.fxplus.ac.uk/tools/HELM/pages/workbooks_1_50_jan2008/Workbook21/21_4_eng_ap_p_z_trnsfms.pdf)
4. <http://www.maths.surrey.ac.uk/hosted-sites/R.Knott/Fibonacci/fib.html>
5. <http://tutorial.math.lamar.edu/Classes/DE/SeriesSolutions.aspx>

**Course Outcomes:**

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

1. Understand the applications of Fourier series in signal processing, structural Engg. Etc.,
2. Understand the properties of Fourier Transforms in real time applications in earth quake detection etc.,
3. Understand the properties of Z-Transforms in real time applications in all engineering applications.
4. Understand the application of function of single variables.
5. Understand the series solution of the ordinary differential equations, the Frobenius method and applications of Frobenius Series. Also understands the length of a curve, volume and surface revolution.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70B17</b>	<b>ADVANCED PHYSICS FOR ENGINEERS (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		3	2	-

**Prerequisites:** Nil

**Course Objective:** The objective of this course is to make the students familiar with the recent advanced concepts in physics

**MODULE I: Special Theory of Relativity: 13 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 13 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 14 Periods**

A: Synthesis 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 12 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 12 Periods**

Single, poly and amorphous silicon, GaAs, CdS, Cu<sub>2</sub>S, 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.

**TEXT BOOKS:**

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>
8. <https://www.youtube.com/watch?v=JygZofFNfE>

**Course Outcomes:**

After completion of this 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.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70B20</b>	<b>CHEMISTRY OF ENGINEERING MATERIALS (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 4</b>		<b>3</b>	<b>2</b>	<b>-</b>

**Pre-requisite:** Nil

**Course Objective:** 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 lubricants, abrasives, glass, ceramics, re-fractories and adhesives. To make the students to 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**

**13 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. Alloys-fabrication of alloys-Ferrous alloys-Non ferrous alloys-industrial applications.

**MODULE II: Lubricants, Abrasives and Adhesives**

**13 Periods**

Introduction to Lubricants-Mechanism of Lubrication-classification of Lubricants-properties of lubricants-viscosity, flash and fire points, cloud and pour points, decomposition stability, saponification number. 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**

**13 Periods**

A: Introduction-Classification of cement-natural –chemical composition of cement-portland cement-chemical reactions involved in setting and hardening of cement.

B: Additives for cement- mortars and 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**

**13 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: Polymers and Composite Materials**

**12 Periods**

Structure and properties of polymers-rubber –classification-vulcanization of rubber –preparation properties and application of Buna-S and Buna-N and Thiokol rubber.Biogradable polymers- poly vinyl acetate and poly lactic acid. Liquid crystals-Introduction-structure of liquid crystal forming compounds-classification-chemical properties-importance and applications.

### **TEXT BOOKS:**

1. P.C.Jain and Monica Jain, “**A text Book of Engineering Chemistry**”, DhanpatRai Publications, New Delhi, 12th Edition 2006.
2. M.Thirumala Chary and E.Laxminarayana, “**Engineering Chemistry**” by SciTech publications (INDIA) PVT Ltd, Third Edition,2016.

### **REFERENCE BOOKS:**

1. B.Rama Devi, Ch.Venkata Ramana Reddy and Prasantha Rath,“**Text Book of Engineering chemistry**” by Cengage Learning India Pvt.Ltd,2016.
2. F.W. Billmeyer, “**Text Book of Polymer Science**”, John Wiley & Sons, 4<sup>th</sup> Edition, 1996.
3. M.G. Fontana, N. D. Greene, “**Corrosion Engineering**”, McGraw Hill Publications, New York, 3rd Edition, 1996.
4. B.R.Puri,L.R.Sharma&M.S.Pathania,“**Principles of Physical Chemistry**”, S.Nagin Chand &Co., New Delhi, 23<sup>rd</sup> Edition, 1993.
5. G.A.Ozin and A.C. Arsenault,“**Nanochemistry: A Chemical Approach to Nanomaterials**”, RSC Publishing, 3<sup>rd</sup> Edition, 2005.

### **E RESOURCES**

1. [www.istl.org/02-spring/internet.html](http://www.istl.org/02-spring/internet.html) (Basics on materials)
2. [https://books.google.co.in/books?id=J\\_AkNu-Y1wQC](https://books.google.co.in/books?id=J_AkNu-Y1wQC) (fuels and lubricants hand book)
3. Journal of materials science (Springer publishers)
4. Journal of materials science and technology (Elsevier publishers)
5. [nptel.ac.in/courses/105102012/](http://nptel.ac.in/courses/105102012/) (Cement concret technology)
6. [nptel.ac.in/courses/112102015/22](http://nptel.ac.in/courses/112102015/22) (lubricants)

### **Course Outcomes**

After completion 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. Students know the usage of lubricants in different temperature conditions.
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. Students will know vulcanization of rubber, bio-degradable polymers and liquid crystals.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70103</b>	<b>SURVEYING (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objectives:** Student will be able to learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, the field applications and concepts of leveling survey.

**MODULE I: Introduction to Basic Concepts** **09 Periods**

Introduction, Objectives, classifications and Principles of surveying, Scales, Shrinkage of maps, conventional symbols and code of signals, Surveying Accessories, phases of surveying.

**MODULE II: Plane Table Survey** **10 Periods**

Instruments employed in plane table survey. Use and adjustment of these instruments including simple alidade. Setting up of the table, Various methods of plane table survey: Radiation method of plane tabling, Intersection or triangulation method of plane tabling, Traversing method of plane tabling, Resection method of plane tabling. Three point and two point problems, errors in plane table survey. Advantages and disadvantages of plane tabling.

**MODULE III: Measurement of Distances and Directions:** **10 Periods**

A:Linear Distances: Approximate methods, direct methods-chains – tapes, ranging- tape corrections, indirect methods- optical methods –E.D.M methods.

B:Prismatic Compass: Bearings Included Angles, Local Attraction, Magnetic Declination and Dip.

**MODULE IV: Leveling and Contouring** **09 Periods**

Basic definitions, types of levels and leveling staves, Temporary and permanent adjustments- method of leveling. Booking and determination of levels-HI method – Rise and fall method, effect of curvature if earth and refraction,

Characteristics and Uses of contours, Direct and indirect methods of contour surveying, interpolation and sketching of Contours.

**MODULE V: Computation of Areas and Volumes** **10 Periods**

Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries, Planimeter. **Volumes:** Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

**TEXT BOOKS:**

1. B.C.Punmia Ashok Kumar Jain and Arun Kumar Jain “**Surveying**” (Vol – 1, 2 & 3), Laxmi Publications (P) ltd., 14<sup>th</sup> Edition, 2014.
2. Duggal S K, “**Surveying**” (Vol – 1 & 2), Tata Mc.Graw Hill Publishing Co. Ltd. 4<sup>th</sup> Edition, 2004.

**REFERENCES:**

1. Arora K R “**Surveying Vol 1, 2 & 3**”, Standard Book House, Delhi, 15<sup>th</sup> Edition, 2015.
2. Chandra A M, “**Plane Surveying**”, New age International Pvt. Ltd., Publishers, New Delhi, 3<sup>rd</sup> Edition 2015.
3. Chandra A M, “**Higher Surveying**”, New age International Pvt. Ltd., Publishers, New Delhi, 3<sup>rd</sup> Edition 2015.

**E RESOURCES**

1. [http://www.whycos.org/fck\\_editor/upload/File/Pacific](http://www.whycos.org/fck_editor/upload/File/Pacific)
2. <http://nptel.ac.in/courses/105107122/>
3. [https://www.youtube.com/watch?v=chhuq\\_t40rY](https://www.youtube.com/watch?v=chhuq_t40rY)

**Course Outcomes:**

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

1. Apply basic geometry to detect difference in plane and arc distance over “spherical” earth surface for typical length survey projects.
2. Identify the importance of the compass survey and its practical applications.
3. Apply basic methods and applications of plane Table survey.
4. Identify the field applications and concepts of leveling survey.
5. Identify the different methods of calculation of area, contouring and measurement of volumes.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70150</b>	<b>GREEN BUILDINGS (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisite: Nil**

**Course Objective:** 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: 09 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: 09 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 Seville, “**Green Building, Principles and Practices in Residential Construction**”, Cengage Publications, 1<sup>st</sup> edition, 2012.
2. Ross Spiegel, Dru Meadows, “**Green Building Materials: A Guide to Product Selection and Specification**”, 3rd Edition, 2010.

**REFERENCES:**

1. Charles J. Kibert, “**Sustainable Construction: Green Building Design and Delivery**”, 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.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70227</b>	<b>ENERGY AUDIT AND CONSERVATION (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**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 manager, 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, 2<sup>nd</sup> Edition, 1995.

## **REFERENCES**

1. Paul O' Callaghan, "**Energy Management**", Mc-Graw Hill Book Company, 1<sup>st</sup> 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.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70240</b>	<b>ENERGY STORAGE SYSTEMS (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**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 (H<sub>2</sub>), 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**”, 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.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code:70347</b>	<b>RENEWABLE ENERGY SOURCES (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**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 tilted 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 09 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 09 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/](http://nptel.ac.in/courses/112105051/)
2. [https://www.vssut.ac.in/lecture\\_notes/lecture1428910296.pdf](https://www.vssut.ac.in/lecture_notes/lecture1428910296.pdf)
3. [faculty.itu.edu.tr/onbasioglu/DosyaGetir/62002](http://faculty.itu.edu.tr/onbasioglu/DosyaGetir/62002)
4. <https://www.journals.elsevier.com/renewable-energy/>
5. [www.ijrer.org](http://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

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70351</b>	<b>TOTAL QUALITY MANAGEMENT (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits:3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**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. Besterfield, "Total Quality Management", Third Edition, Pearson Education Asia, Indian Reprint, 2010.
2. Subburaj Ramasamy“ Total Quality Management” Tata Mcg raw hill edition, 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, First Indian 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](https://src.alionscience.com/pdf/RAC-1ST/SOAR7_1st_Chapter.pdf)
2. [https://onlinecourses.nptel.ac.in/noc17\\_mg18](https://onlinecourses.nptel.ac.in/noc17_mg18)
3. [nptel.ac.in/courses/122106032/Pdf/4\\_2.pdf](https://nptel.ac.in/courses/122106032/Pdf/4_2.pdf)
4. [www.thecqi.org](http://www.thecqi.org)
5. [www.emeraldinsight.com/journal/tqm](http://www.emeraldinsight.com/journal/tqm)
6. [www.emeraldinsight.com/doi/pdf/10.1108/09544789710367712](http://www.emeraldinsight.com/doi/pdf/10.1108/09544789710367712)
7. [www.statit.com/statitcustomqc/StatitCustomQC\\_Overview.pdf](http://www.statit.com/statitcustomqc/StatitCustomQC_Overview.pdf)

## 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

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70430</b>	<b>DIGITAL DESIGN USING VERILOG HDL (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites: Nil**

**Course Objectives:** This course introduces the concepts associated with understanding of VLSI Design flow and Verilog language constructs, the Gate level ,behavioral ,switch level and dataflow design descriptions of verilog and also the sequential circuits modeling using verilog and Testing methods.

**MODULE I: Introduction to Verilog HDL**

**8 Periods**

Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Function Verification, System Tasks, Programming Language Interface, MODULE, Simulation and Synthesis Tools.

Language Constructs and Conventions: Introduction, Keywords, Identifiers, White space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data types, Scalars and Vectors, Parameters, Operators.

**MODULE II: Gate Level & Data Flow Modeling**

**10 Periods**

Gate Level Modeling: Introduction, AND Gate Primitive, MODULE Structure, Other Gate Primitives, Illustrative Examples, Tristate Gates, Array of Instances of Primitives, Design of Flip –Flops with Gate Primitives, Delays, Strengths and Construction Resolution, Net Types, Design of Basic Circuit.

Modeling at Dataflow Level: Introduction, Continuous Assignment Structure, Delays and Continuous Assignments, Assignment to Vectors, Operators.

**MODULE III: Behavioral Modeling**

**10 Periods**

A: Introduction, Operations and Assignments, Functional Bifurcation, ‘Initial’ Construct, ‘Always’ Construct, Assignments with Delays, ‘Wait’ Construct, Multiple Always Block, Designs at Behavioral Level, Blocking and Non- Blocking Assignments,

B: The ‘Case’ Statement, Simulation Flow ‘If’ an ‘If-Else’ Constructs, ‘Assign- De-Assign’ Construct, ‘Repeat’ Construct, for Loop, ‘The Disable’ Construct, ‘While Loop’, Forever Loop, Parallel Blocks, ‘Force- Release, Construct, Event.

**MODULE IV: Switch Level Modeling**

**10 Periods**

Switch Level Modeling: Basic Transistor Switches, CMOS Switches, Bi Directional Gates, Time Delays With Switch Primitives, Instantiation with ‘Strengths’ and ‘Delays’, Strength Contention with Trireg Nets.

System Tasks, Functions and Compiler Directives: Parameters, Path Delays, MODULE Parameters, System Tasks and Functions, File Based Tasks and Functions, Computer Directives, Hierarchical Access, User Defined Primitives.

## **MODULE V: Sequential Circuit Description and Testing**

**10 Periods**

Sequential Circuit Description: Sequential Models - Feedback Model, Capacitive Model, Implicit Model, Basic Memory Components, Functional Register, Static Machine Coding, Sequential Synthesis

Component Test and Verification: Test Bench- Combinational Circuit Testing, Sequential Circuit Testing, Test Bench Techniques, Design Verification, Assertion Verification.

### **TEXT BOOKS:**

1. T R. Padmanabhan, B Bala Tripura Sundari, “**Design Through Verilog HDL**”, Wiley, 2009.
2. Zainalabdien Navabi, “**Verilog Digital System Design**”, TMH, 2<sup>nd</sup> Edition, 1999.

### **REFERENCES:**

1. Stephen Brown, Zvonkoc Vranesic, “**Fundamentals of Digital Logic with Verilog Design**”, TMH, 2<sup>nd</sup> Edition, 2010.
2. Sunggu Lee, “**Advanced Digital Logic Design using Verilog, State Machine & Synthesis for FPGA**”, Cengage Learning, 2012.
3. Samir Palnitkar, “**Verilog HDL**”, Pearson Education, 2<sup>nd</sup> Edition, 2009.
4. Michel D. Ciletti, “**Advanced Digital Design with the Verilog HDL**”, PHI, 2009.

### **E-RESOURCES:**

1. [https://www.tutorialspoint.com/vlsi\\_design/vlsi\\_design\\_verilog\\_introduction.htm](https://www.tutorialspoint.com/vlsi_design/vlsi_design_verilog_introduction.htm)
2. <http://www.asic-world.com/verilog/first1.html>
3. <https://doaj.org/article/4f07787948ce4bfc9c468f1cbcf9e190>
4. <http://nptel.ac.in/courses/106105083/>

### **Course Outcomes:**

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

1. Understand overview of Verilog HDL programming and its language constructs.
2. Write Verilog HDL Program for Gate level modeling and dataflow modeling of digital circuits.
3. Understand behavioral modeling constructs and can able to write Verilog HDL program with behavioral modeling.
4. Write Verilog Program for MOS transistors circuits using switch level modeling and also understand usage of system Tasks.
5. Write Verilog Program for sequential circuit which modeled in state machine and understand the concept of Test Bench techniques for digital design verification.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70438</b>	<b>SATELLITE COMMUNICATIONS (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objectives:**

The objective of the course is to prepare students to excel in basic knowledge of satellite communication principles by providing the students a solid foundation in orbital mechanics and launches for the satellite communication. The course aims at offering the students a basic knowledge of link design of satellite with design examples, a better understanding of multiple access systems and earth station technology and sufficient knowledge in satellite navigation, GPS and satellite packet communications.

**MODULE I: Communication Satellite: Orbit and Description**

**09 periods**

A Brief history of satellite Communication, Satellite Frequency Bands, Satellite Systems, Applications, Orbital Period and Velocity, effects of Orbital Inclination, Azimuth and Elevation, Coverage angle and slant Range, Eclipse, Orbital Perturbations, Placement of a Satellite in a Geo-Stationary orbit.

**MODULE II: Satellite Sub-Systems and Satellite Link**

**10 periods**

**Satellite Sub-Systems:**

Attitude and Orbit Control system, TT&C subsystem, Attitude Control subsystem, Power systems, Communication subsystems, Satellite Antenna Equipment.

**Satellite Link:**

Basic Transmission Theory, System Noise Temperature and G/T ratio, Basic Link Analysis, Interference Analysis, Design of satellite Links for a specified C/N, (With and without frequency Re-use), Link Budget.

**MODULE III: Propagation Effects and Multiple Access**

**10 periods**

**A: Propagation Effects:**

Introduction, Atmospheric Absorption, Cloud Attenuation, Tropospheric and Ionospheric Scintillation and Low angle fading, Rain induced attenuation, rain induced cross polarization interference.

**B: Multiple Access:**

Frequency Division Multiple Access (FDMA) – Inter modulation, Calculation of C/N, Time Division Multiple Access (TDMA) - Frame Structure, Burst Structure, Satellite Switched TDMA, On-board Processing, Demand Assignment Multiple Access (DAMA) – Types of Demand Assignment, Characteristics, CDMA Spread Spectrum Transmission and Reception.

**MODULE IV: Earth Station Technology, Satellite Navigation and Global Positioning Systems**

**10 periods**

**Earth Station Technology:**

Transmitters, Receivers, Antennas, Tracking Systems, Terrestrial Interface, Power Test Methods, Lower Orbit Considerations.

## **Satellite Navigation and Global Positioning Systems:**

Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers, GPS C/A Code Accuracy, Differential GPS.

## **MODULE V: Satellite Packet Communications**

**09 periods**

Message Transmission by FDMA: M/G/1 Queue, Message Transmission by TDMA, PURE ALOHA-Satellite Packet Switching, Slotted Aloha, Packet Reservation, Tree Algorithm.

### **TEXT BOOKS:**

1. Timothy Pratt, Charles Bostian, Jeremy Allnut, **“Satellite Communications”**, John Wiley & Sons, 2<sup>nd</sup> Edition, 2003.
2. Wilbur, L. Pritchard, Robert A. Nelson and Heuri G. Suyderhoud, **“Satellite Communications Engineering”**, Pearson Publications, 2<sup>nd</sup> Edition.

### **REFERENCES:**

1. Dennis Roddy, **“Satellite Communications”**, Tata Mc.Graw Hill, 2<sup>nd</sup> Edition, 1996.
2. M. Richcharia, **“Satellite Communications: Design Principles”**, 2<sup>nd</sup> Ed., BSP, 2003.
3. Tri.T.Ha, **“Digital Satellite Communications”**, Tata Mc.Graw Hill, 2<sup>nd</sup> Edition, 1990.
4. K. N. Raja Rao, **“Fundamentals of Satellite Communications”**, PHI, 2004.

### **E-RESOURCES:**

1. <https://www.britannica.com/technology/satellite-communication>
2. [http://www.radio-electronics.com/info/satellite/communications\\_satellite/satellite-communications-basics-tutorial.php](http://www.radio-electronics.com/info/satellite/communications_satellite/satellite-communications-basics-tutorial.php)
3. [https://www.nasa.gov/directorates/heo/scan/communications/outreach/funfacts/txt\\_satellite\\_comm.html](https://www.nasa.gov/directorates/heo/scan/communications/outreach/funfacts/txt_satellite_comm.html)
4. [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1542-0981](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1542-0981)
5. <http://www.inderscience.com/jhome.php?jcode=ijscpm>
6. <http://nptel.ac.in/courses/117105131/>

### **Course Outcomes:**

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

1. Understand the historical background, basic concepts and frequency allocations for satellite communication.
2. Demonstrate orbital mechanics, launch vehicles and launchers.
3. Demonstrate the design of satellite links for specified C/N with system design examples.
4. Visualize satellite sub systems like Telemetry, tracking, command and monitoring power systems etc.
5. Understand the various multiple access systems for satellite communication systems and satellite packet communications.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70539</b>	<b>ANDROID APPLICATION DEVELOPMENT (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**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**

**09 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: Introduction to Android and Installation**

**09 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: Android Application Design and Settings**

**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: Android UID and Techniques**

**10 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: Android APIs-I & APIs-II**

**10 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, 2<sup>nd</sup> edition, 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**”, 1<sup>st</sup> edition, 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.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70544</b>	<b>SOFTWARE PROJECT MANAGEMENT (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objectives:**

This Course will enables the students to understand the conventional software management and necessary methods for improve software economics, define software project management principles, life cycle, artifacts, to understand and explain process work flows, checkpoints of process, iterative planning, learn and solve process automation, project process instrumentation and control, metrics, tailoring the process, analyze and evaluate project organization responsibilities, management and case studies.

**MODULE I: Conventional Software Management and Software Economics 10 Periods**

Conventional Software Management - The waterfall model, conventional software management performance, Overview of project planning – stepwise project planning.

Improving Software Economics - Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

**MODULE II: Phases and Process 10 Periods**

The old and new way - The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

Life Cycle Phases - Engineering and production stages, Inception, Elaboration, Construction, Transition phases.

Artifacts of the Process - The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

**MODULE III: Software Process and Process Planning 09 Periods**

A: Work Flows and Checkpoints of the Process - Software process workflows, Iteration workflows, Major mile stones, Minor Milestones, Periodic status assessments

B: Iterative Process Planning - Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

**MODULE IV: Process Automation and Instrumentation 09 Periods**

Process Automation - Automation Building blocks.

Project Control and Process Instrumentation - The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

Tailoring the Process - Process discriminates.

**MODULE V: Project Organizations and Future SPM 10 Periods**

Project Organizations and Responsibilities - Line-of-Business Organizations, Understanding Behavior – Organizational Behavior. Future Software Project Management - Modern Project Profiles, Next generation Software economics, modern process transitions.

Case Study - The command Center Processing and Display system-Replacement (CCPDS-R)

## **TEXT BOOKS**

1. Walker Royce, "**Software Project Management**", Pearson Education, 2005.
2. Bob Hughes and Mike Cottrell, "**Software Project Management**", Tata McGraw Hill Education, 5<sup>th</sup> Edition, 2010.

## **REFERENCES**

1. Joel Henry, "**Software Project Management, A Real -World Guide to Success**", Pearson Education, 3<sup>rd</sup> Edition, 2009.
2. Pankaj Jalote, "**Software Project Management in Practice**", Addison-Wesley, 2002.

## **E-RESOURCES**

1. <https://books.google.co.in/books?isbn=0201309580>
2. <https://books.google.co.in/books?isbn=0070706530>
3. [http://www.uta.fi/sis/reports/index/R31\\_2014.pdf](http://www.uta.fi/sis/reports/index/R31_2014.pdf)
4. <http://nptel.ac.in/courses/106101061/18>
5. <http://nptel.ac.in/courses/106101061/29#>

## **Course Outcomes:**

On the successful completion of the course, a student will be able to:

1. Identify the conventional software management planning.
2. Demonstrate the principles of conventional software Engineering, Life cycle Phases, and Artifacts of the process.
3. Apply Work Flows, Checkpoints of the process and Iterative Process Planning.
4. Evaluate metrics for tailoring the process.
5. Design and Apply project responsibilities and analyze various case studies.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70605</b>	<b>ADVANCED JAVA PROGRAMMING (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Java Programming

**Course Objectives:**

This course provides the students a clear understanding of analyzing the way of transportation of data using XML and the significance of Java Bean, develop dynamic web applications using Servlets, build a web application which connects to database and interpret the importance of JSP over Servlets.

**MODULE I: Introduction to XML**

**08 Periods**

Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

**MODULE II: Introduction to Advanced Java and Java Beans**

**10 Periods**

Advanced Java- Java Swing package: use of System class, Applet Context, signed applet, object serialization, shallow and deep copying, Java collections: Iterators, Array Lists, sets, hash set, hash table, queue, priority queue, class-vector, class-comparable interface.

Java Beans- Introduction to Java Beans, Advantages of Java Beans, JDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizes, Java Beans API, Introduction to EJB's.

**MODULE III: Introduction to Servlets and Servlet Programming**

**10 Periods**

A: Introduction to Servlets- Tomcat web server, Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax. Servlet Package.

B: Servlet Programming - Reading Servlet parameters, Reading Initialization parameters. The javax.servlet HTTP package, Handling Http Request and Responses, Using Cookies-Session Tracking, Security Issues.

**MODULE IV: Database and JSP**

**10 Periods**

Database Access -Database Programming using JDBC, JDBC drivers, Studying Javax.sql.\* package, Accessing a Database from a Servlet. Prepared Statements.

Introduction to JSP- The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment.

**MODULE V: JSP Application Development**

**10 Periods**

Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Conditional Processing: Displaying Values Using an Expression, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations, Accessing a Database from a JSP page, Deploying JAVA Beans in a JSP Page, Introduction to struts framework.

**TEXT BOOKS:**

1. Dietel and Nieto, “**Internet and World Wide Web – How to program**”, PHI/Pearson Education Asia.
2. Patrik Naughton, Herbert Schildt, “**The Complete Reference, Java**”, Third Edition, TMH.
3. Marty Hall and Larry Brow, “**Core servlets and java server pages volume 1: core technologies**”, Pearson.

**REFERENCES:**

1. Paul S. Wang, Sanda Katila.Thomson, “**An Introduction to Web Design and Programming**”, Course Technology Inc Publications, 2003.
2. Jon Duckett, Wrox, , “**Beginning Web Programming**”, wiley India Pvt. Ltd., 2008.

**E -RESOURCES**

1. <http://xml.coverpages.org/xml.html>
2. <https://www.tutorialspoint.com/html/>
3. <https://www.javatpoint.com/servlet-tutorial>
4. [https://ndl.iitkgp.ac.in/result?q={%22t%22:%22search%22,%22k%22:%22web%20technologies%22,%22s%22:\[\],%22b%22:{%22filters%22:\[\]}}}](https://ndl.iitkgp.ac.in/result?q={%22t%22:%22search%22,%22k%22:%22web%20technologies%22,%22s%22:[],%22b%22:{%22filters%22:[]}})
5. <http://nptel.ac.in/courses/106105084/>

**Course Outcomes:**

On the successful completion of the course, a student will be able to:

1. Understand the role of XML in web programming.
2. Develop applications using Java Beans.
3. Build dynamic web applications using Servlets.
4. Demonstrate how an application can connect to a database.
5. Illustrate the importance of JSP in web programming.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70621</b>	<b>MANAGEMENT INFORMATION SYSTEM (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites: Nil**

**Course Objectives:**

This course enables the students to evaluate the role of the major types of information systems in a business environment and their relationship to each other, assess the impact of the Internet, Internet technology on business electronic commerce, electronic business, identify the major management challenges to building, using information systems and learn how to find appropriate solutions to those challenges.

**MODULE I: Information system development**

**10 Periods**

Information System- Matching the Information System Plan to the Organizational Strategic Plan – Identifying Key Organizational Objective and Processes and Developing an Information System Development.

Systems Development - User role in Systems Development Process – Maintainability and Recoverability in System Design.

**MODULE II: Representations and Analysis**

**10 Periods**

Models for Representing Systems- Mathematical, Graphical and Hierarchical (Organization Chart, Tree Diagram) – Information Flow – Process Flow – Methods and Heuristics.

Analysis of System Structure - Decomposition and Aggregation – Information Architecture – Application of System Representation to Case Studies.

**MODULE III: Information and decision theory**

**10 Periods**

A: Information Theory: Information Theory – Information Content and Redundancy – Classification and Compression – Summarizing and Filtering – Inferences and Uncertainty.

B: Decision Theory: Identifying Information needed to Support Decision Making – Human Factors – Problem characteristics and Information System Capabilities in Decision Making.

**MODULE IV: Role of IT in information system**

**09 Periods**

Information System Application- Transaction Processing Applications – Basic Accounting Application – Applications for Budgeting and Planning.

Use of Information Technology- Automation – Word Processing – Electronic Mail – Evaluation Remote Conferencing and Graphics – System and Selection – Cost Benefit – Centralized versus Decentralized Allocation Mechanism.

**MODULE V: Information system development**

**09 Periods**

Development of Information Systems-I- Systems analysis and design – System development life cycle – Limitation – End User.

Development of Information Systems-II- Managing End Users – off- the shelf software packages – Outsourcing – Comparison of different methodologies.

**TEXT BOOKS:**

1. Laudon K.C, Laudon J.P, Brabston M.E, “**Management Information Systems-Managing the digital firm**”, Pearson Education, 2004.

**REFERENCES:**

1. Turban E.F, Potter R.E, “**Introduction to Information Technology**”;Wiley, 2 004.
2. Jeffrey A.Hoffer, Joey F.George, Joseph S. Valachich, “**Modern Systems Analysis and Design**”, Third Edition, Prentice Hall, 2002.

**E -RESOURCES**

1. [http://iefb.weebly.com/uploads/1/4/2/4/14240576/libri\\_per\\_msi.pdf](http://iefb.weebly.com/uploads/1/4/2/4/14240576/libri_per_msi.pdf)
2. <http://www.aabri.com/manuscripts/10736.pdf>
3. <http://www.nptelvideos.in/2012/11/management-information-system.html>

**Course Outcomes:**

On the successful completion of the course, a student will be able to:

1. Understand the processes of developing and implementing information systems.
2. Analyze various Representations and analysis of system structure.
3. Comprehend the techniques in information theory and decision theory.
4. Implement various applications in Information Systems.
5. Deploy information systems suitable for end users.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B. Tech</b>		
<b>Code: 72504</b>	<b>DRILLING AND BLASTING (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** 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**

**9 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**

**09 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**

**10 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.

**REFERENCE BOOKS:**

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

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B. Tech</b>		
<b>Code: 72543</b>	<b>TUNNELING ENGINEERING (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** 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,  
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**

**09 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**

**09 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, New York, 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\\_](http://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

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech</b>		
<b>Code: 7B108</b>	<b>CREATIVITY AND INNOVATIONS MANAGEMENT (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>		<b>-</b>

**Prerequisites: NIL**

**Course Objectives:**

To enhance creative potential by strengthening various mental abilities and shape an ordinary learner to become an extraordinary learner; to expand the knowledge horizon of individual creativity and corporate creativity to transform the living conditions of the society.

**MODULE I: Creativity**

**10 Periods**

**Realms of Creativity:** Creativity Concept- Convergent and Divergent Thinking- Creative abilities - Creativity Intelligence, Enhancing Creativity Intelligence-Determinants of Creativity - Process-  
**Roots of Human Creativity-**Biological, Mental, Spiritual Social- Forms of Creativity- Essence, Elaborative and Expressive-Existential, Entrepreneurial and Exponential.

**MODULE II: Creative Personality**

**10 Periods**

**Creative Personality:** Traits - Congenial to Creativity- Motivation and Creativity- Strategies for Motivation for being creative-  
**Conductive Environment:** Formative Environment and Creativity- Environmental Stimulants- Blocks to Creativity- Strategies for unblocking Creativity.

**MODULE III: Corporate Creativity**

**10 Periods**

**A: Corporate Creativity:** Creative Manager- Creative Problems Solving, Techniques of Creative Problem Solving- Perpetual Creative Organizations-Creative Management Practices:  
**B: Various Management techniques:** Human Resource Management, Marketing Management, Management of Operations, Management of Product Design and Growth Strategies – Collective Creativity.

**MODULE – IV: Creative Organisation**

**09 Periods**

**Creative Organisation:** Issues and approaches to the Design of Creative Organizations - Successful innovative organization structure.  
**Mechanisms stimulating Organizational Creativity-** Creative Societies, Model of creative society.

**MODULE – V: Management of Innovation**

**09 Periods**

**Management of Innovation:** Nature of Innovation-Technological Innovations and their Management, Management Innovative entrepreneurship.  
**Agents of Innovation-**Skills for Sponsoring Innovation, Practice cases and situations.

## **TEXT BOOKS**

1. P. N. Rastogi, “**Managing Creativity of Corporate Excellence**”, Macmillan, New Delhi.

## **REFERENCE BOOKS:**

1. Jone Ceserani, Pater Greatwood, “**Innovation and Creativity**”, Crest Publishing House, New Delhi.
2. Pradip Khandwalla, “**Lifelong Creativity**”- An Unending Quest, Tata McGraw Hill, 2006.
3. Pradip Khandwalla, “**The Corporate Creativity**” -The Winning Edge, Tata McGraw Hill New Delhi.
4. Christensen Clayton, “**Innovation and General Manager**”, Tata McGraw Hill.
5. Margaret. A,Whit& Gary D. Bruton- “**The Management of Technology Innovation- A Strategic Approach**”.
6. CSG Krishnama Charyulu & R. Lalitha- “**Innovation Management**”, Himalaya Publishing House, 2007.

## **E RESOURCES:**

1. <http://www.learnerstv.com/Free-Management-Video-lectures-ltv132-Page1.htm>
2. <http://linksp.com/article/Reingold-LINK-Creative-Manager-Job-Posting-Jan-15.pdf>
3. [http://creativeskillset.org/creative\\_industries/advertising\\_and\\_marketing\\_communications/job\\_roles](http://creativeskillset.org/creative_industries/advertising_and_marketing_communications/job_roles)
4. <http://nptel.ac.in/courses/109101003/15>
5. <http://nptel.ac.in/courses/109104107/>

## **Course Outcomes:**

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

1. Understand the basic concepts of creativity management.
2. Develop a creative personality and can become an extraordinary learner.
3. Student will be able to understand the techniques of Creative Problem Solving and Creative Management Practices.
4. Understand the Issues and approaches to the Design of Creative Organizations and Mechanisms stimulating Organizational Creativity.
5. Understand the nature and management of innovation.



<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech</b>		
<b>Code: 7B136</b>	<b>DIGITAL MARKETING (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites: NIL**

**Course Objective:**

The objective of this course is to expose the student to digital marketing mainly for lead generation and retention activities in both business to business and business to consumer environments.

**MODULE-I: Digital marketing 09 Periods**

**Introduction of Digital Marketing:** Digital Marketing meaning- need of digital marketing- Digital Marketing Vs Traditional Marketing- Digital Marketing Process-  
**Creating digital marketing strategy-** Digital Marketing era and the way forward.

**MODULE-II: Search Engine and Social media Optimization 10 Periods**

**Introduction to Search Engine Optimization:** What is Search Engine?, Type of Search Engines, Search Engine Optimization Types- SEO life cycle Difference between Organic and Inorganic- Keyword Research -Google Trends- On-Page Optimization- Off-Page Optimization.

**Introduction to Social Media Optimization:** Social Media- importance- Social Media Marketing- Branding - Paid Advertising – Blogging- Face book –Twitter, LinkedIn- Slide Share- Social Media Management Tool (SMMT).

**MODULE-III: Google Adwards and tools 10 Periods**

**A. Google Adwards:** Navigating through Google AdWords- Understanding Google AdWords Structure- Writing Ads in Google AdWords

**B. Google Tools:** Keyword Planner Tool- Google Webmaster Tool- Google Analytics- Reporting and Analysis Tool.

**MODULE-IV: E-Mail marketing 10 Periods**

**Email Marketing:** How Email works?- Challenges while sending bulk emails- Solution over challenges- Types of email marketing- Email marketing Tools

**Designing of Email template-** Email marketing scheduler- Email marketing success tracking - Lead Generation for Business.

**MODULE-V: Forms of Digital Marketing 9 Periods**

**Other forms of Digital marketing:** Mobile marketing- Inbound marketing-content marketing

**E-commerce marketing-** Affiliate marketing- YouTube channel marketing.

### **Text Books**

1. Vandana Ahuja, “**Digital Marketing**” – Oxford Higher Education-2015

### **Reference books:**

1. Philip Kotler, Kevin Lane Keller, Abraham Koshy and Mithleshwar Jha: **Marketing Management**, 13/e, Pearson Education, 2012.
2. Michael miller, **B2B Digital Marketing: Using the Web to Market Directly to Businesses**, 1/e, Pearson Education.
3. Dave Chaffey, Fiona Ellis-Chadwick, **Digital Marketing: Strategy, Implementation and Practice**, Pearson, 6<sup>th</sup> edition -2015.
4. Jeanniey Mullen, David Daniels, **Email Marketing: an Hour a Day**, Times Knowledge series-2010.

### **E Resources:**

1. <http://freevideolectures.com/Course/2752/Future-of-Marketing>
2. <http://www.onlinevideolecture.com/?course=mba-programs&subject=marketing-fundamental>
3. <http://nptel.ac.in/courses/110104070/>
4. <http://nptel.ac.in/courses/110104068/>

### **Course Outcomes:**

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

1. Learn the basics of digital marketing and also be able to develop a comprehensive digital marketing strategy
2. Understand the concept of search engine and its optimization process.
3. Understand the basic concepts of social media marketing and its management.
4. Learn the basics of Google Adwards and tools and its application in digital marketing.
5. Learn various emerging platforms of digital marketing.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B. Tech.</b>		
<b>Code: 70H08</b>	<b>INTERPRETATION SKILLS AND ANALYTICAL WRITING (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisite:** Nil

**Course Objective:** 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.

**Introduction:**

Developing Analytical writing skills through interpretation of literature and enabling the students to think critically. It assesses the ability to articulate and support complex ideas, construct and evaluate arguments and sustain a focused and coherent discussion. Interpreting the text triggers the students analytical and critical thinking skills while expanding their outlook.

**Methodology:**

- Giving them exercises pertaining to translation of their thoughts into words.
- Giving them vocabulary exercises in different contexts.
- Find supporting evidence.
- Make an outline

**MODULE I: Introduction to Interpretation Skills**

**10 Periods**

- Interpretation in different settings
- Interpretation of Literature
- Understanding the main ideas in the text
- Vocabulary by Theme

From the short novel: Animal Farm: George Orwell

**MODULE II: Approaches to Reading**

**09 Periods**

- Biographical
- Historical
- Gender
- Sociological

**MODULE III: Critical Reading**

**10 Periods**

- Introduction
- The Theme
- Figurative language and characterization
- Interpreter's role and ethics
- Interpretation of story.
- Interpretation of characters
- Animal characters

- Human characters
- Key events
- Things
- Places

#### **MODULE IV: Analytical Writing**

**10 Periods**

- Responding to various situations
- Entering into the role and responding
- Analyze an ISSUE
- Analyze an Argument
- Verbal Reasoning
- Interpretive Reports

From the short novel: Animal Farm : George Orwell

#### **MODULE V: Creative Writing**

**09 Periods**

- Figurative Language
- Imagery
- Writing a short Poem
- Writing a short Story

#### **REFERENCES**

1. GRE by CliffsTestPrep-7<sup>th</sup> 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](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://www.academypublication.com/issues/past/jltr/vol04/06/11.pdf> (Interpreting Skills)
7. <http://onlinelibrary.wiley.com/doi/10.1111/j.1540-4781.1983.tb01478.x/full> (Approaches to Reading)
8. [https://vhhsougars.org/files/vhhs/docs/n10/crj\\_faqs.pdf](https://vhhsougars.org/files/vhhs/docs/n10/crj_faqs.pdf) (Critical Reading)
9. <http://www.msmbainusa.com/articles/entrance-preparations/prepare-for-gre-analytical-writing-tasks/> (Analytical Writing)
10. <http://scholarworks.rit.edu/jcws/aimsandscope.html> (Creative Writing )
11. <https://www.youtube.com/watch?v=N0ePX99GM70> (Approaches to Reading)
12. <https://www.youtube.com/watch?v=5Hc3hmwnymw> (Critical Reading)
13. <https://www.youtube.com/watch?v=ix1qUEM9ahg> (Analytical Writing)
14. [https://www.youtube.com/watch?v=6Y2\\_oQobo\\_0](https://www.youtube.com/watch?v=6Y2_oQobo_0) (Creative Writing)

**Course Outcomes:**

After completion of the 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.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70H09</b>	<b>WORLD LITERATURES (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisite:** Nil

**Course Objectives:**

The undergraduates need to know about the societies across the globe to understand their society better and to bring awareness about the societies across the globe. As a result the students would understand the cultures of different nations as they are going to enter into global careers and have a considerable knowledge about these cultures of different nations will help them to cope with the culture shock. Identify and describe distinct literary characteristics of modern literature. This further helps the learners to effectively communicate ideas related to modern works during class and group activities.

**MODULE I:**

- **Introduction to literature** **09 Periods**
- **Elements of literature( Key Concepts)**

**MODULE II:**

- **Figures of Speech** **09 Periods**

**MODULE III:**

- **Poetry** **10 Periods**

**Ode to Autumn by John Keats**

**Mending the Wall by Robert Frost**

**Clouds and Waves by Ravindranath Tagore**

**MODULE IV:**

- **Short Stories** **10 Periods**

**The Eyes are Not Here by Ruskin Bond**

**The Policeman and the Rose by Raja Rao**

**Cat in the Rain by Ernest Hemmingway**

**MODULE V:**

- **One - act plays** **10 Periods**

**A Marriage Proposal by Anton Chekov**

**The Price by Arthur Miller**

## REFERENCES

1. Guy de Maupassant, “**Original Short Stories of Maupassant**”, The Floating Press, 2014.
2. Robin Pickering-Iazzi, “**Unspeakable Women: Selected Short Stories Written by Italian Women during Fascism**”, The Feminist Press, New York, 1993.

## RESOURCES

1. [www.naosite.lb.nagasaki-u.ac.jp/dspace/bitstream/.../keieikeizai70\\_03\\_08.pdf](http://www.naosite.lb.nagasaki-u.ac.jp/dspace/bitstream/.../keieikeizai70_03_08.pdf)
2. [www.poetryfoundation.org](http://www.poetryfoundation.org)
3. [www.bigbridge.org/BB17/poetry/indianpoetryanthology/Gieve\\_Patel.html](http://www.bigbridge.org/BB17/poetry/indianpoetryanthology/Gieve_Patel.html)
4. <http://gepeskonyv.btk.elte.hu/adatok/Anglisztika/74Barcs%E1k/index.html> (Introduction to literature )
5. [http://hrsbstaff.ednet.ns.ca/lownie/Eng%2011%20seven\\_key\\_elements\\_of\\_literature.htm](http://hrsbstaff.ednet.ns.ca/lownie/Eng%2011%20seven_key_elements_of_literature.htm) (Elements of literature)
6. <https://literaryterms.net/figures-of-speech/> (Figures of Speech)
7. <http://www.one-act-plays.com/> (One-Act-Plays)
8. <https://bridgepoint.equella.college.com/curriculum/file/cd11d642-a307-496d-b8f0-9c207abc4b42/1/ENG125%20-%20About%20Journals.p> (Introduction to literature)
9. [http://www.biblicalresearchjournal.org/brj-pages\\_pdf/001ewb\\_figures\\_of\\_speech.pdf](http://www.biblicalresearchjournal.org/brj-pages_pdf/001ewb_figures_of_speech.pdf) (Figures of Speech)
10. <https://www.youtube.com/watch?v=xC3M9EqduyI&list=PLbMVogVj5nJSrNC8yTkDpzu5uRzX5re9q> (Introduction to literature )
11. <https://www.youtube.com/watch?v=YM6rdgXvemM> (Poetry)

## Course Outcomes:

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

1. Learn about the literatures of different nations and continents.
2. Understand the cultures of different societies of the world and are ready to cope with the culture shock they might experience when set to work in global environment.
3. Display a working knowledge of the historical and cultural contexts of world literature.
4. Analyze literary works for their structure and meaning.
5. Write analytically about literature using guidelines.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70B14</b>	<b>APPLIED STATISTICS (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Pre-requisite:** Nil

**Course Objective:** 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** **09 Periods**  
 Analysis of Variance (ANOVA): one-way & two-way ANOVA and multiple comparisons. Introduction to Factorial design -  $2^2$  and  $2^n$  Factorial design.  
 Analysis of Co-variance (ANCOVA) (Only one way). Conducting ANCOVA – Two way

**MODULE II: Design of Experiments** **10 Periods**  
 Design of Experiments: Importance and applications of design of experiments. Principles of experimentation, Analysis of Randomized Block Design (R.B.D) , Completely randomized Design (C.R.D) and Latin Square Design (L.S.D) including one missing observation, expectation of various sum of squares. 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: Correlation, Regression & Time Series** **10 Periods**  
**Correlation & Regression:** Correlation, Coefficient of correlation, the rank correlation. Regression, Regression Coefficient, The lines of regression: simple regression, regression for 3 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** **09 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):( $\infty$ :FIFO) Model, (M/M/1):(N:FIFO) Model .

**TEXT BOOKS:**

1. V.K.Kapoor and S.C.Gupta, “**Fundamentals of Applied Statistics**”, Sultan Chand & Sons, New Delhi.
2. J K Sharma, “**Operations research Theory and applications**”, Macmillan publishers India limited, 4<sup>th</sup> edition.



## REFERENCE

1. Willam Feller : “**Introduction to Probability theory and its applications**”. Vol-I, Wiley 2<sup>nd</sup> edition.
2. GoonAM, Gupta MK, Das Gupta B : “**Fundamentals of Statistics**”, Vol-I, The World Press Pvt.Ltd.,
3. Montgomery, “**Applied statistics and probability for engineers**”. John Wiley Publications, 5<sup>th</sup> edition.
4. 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 Qualitycontrol)
3. [http://irh.inf.unideb.hu/~jsztrik/education/16/SOR\\_Main\\_Angol.pdf](http://irh.inf.unideb.hu/~jsztrik/education/16/SOR_Main_Angol.pdf) (Basic Queueing Theory)
4. <https://www.math.kth.se/matstat/gru/sf2943/ts.pdf> (Time Series Analysis)
5. <http://nptel.ac.in/courses/105105045/40> (correlation and regression Analysis)

## Course Outcomes:

After completion of the course students will be able to:

1. Perform Analysis of variance, ANCOVA and design of experiments in manufacturing firms.
2. Apply advanced design of experiments and their applications.
3. Understand the concept of quality control, Six Sigma and its importance to real life problems.
4. Understand the concept of Correlation, regression and Application of Time-series,
5. Find the expected queue length, the ideal time, the traffic intensity and the waiting time.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70B16</b>	<b>OPTIMIZATION TECHNIQUES (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Pre-requisites:** Nil

**Course Objective:** 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 to Operations Research**

**10 Periods**

Definition, scope, objectives, phases, objectives, models and limitation of Operations Research, Linear Programming Problem-Formulation of LPP, Graphical solution of LPP, Simplex method, Artificial variable, big-M method, two-phase method, degeneracy & unbound solution.

**MODULE II: Transportation Problems**

**10 Periods**

Formulation, solution, Un balanced Transportation problem, Finding basic feasible solution-Northwest corner rule, least cost method and Vogel's approximation method. Optimality test: the stepping stone method and MODI method.

**Assignment Models:** Formulation. Hungarian method for optimal solution. Solving unbalanced problem. Travelling salesman problem as assignment problem.

**MODULE III:**

**10 Periods**

**A: Sequencing Models:** Solution of sequencing problem-processing n jobs through 2 machines, processing n jobs through 3 machines, processing 2 jobs through m machines, processing n jobs through m machines.

**B: Replacement Models:** Replacement of items that deteriorate whose maintenance cost increase with time without change in the money value. Replacement of items that fail suddenly: individual replacement policy, group replacement policy.

**MODULE IV: Game Theory**

**09 Periods**

Competitive games, rectangular game, saddle point, minimax (maximin) method of optimal strategies, value of the game. solution of games with saddle points, dominance principal. Rectangular games without saddle points-mixed strategy for 2x2 games.

**MODULE V: Inventory Models**

**09 Periods**

Inventory cost, Models with deterministic demand-model (a) demand rate uniform and production rate infinite, model(b) demand rate non-uniform and production rate infinite, model(c) demand rate uniform and production rate finite.

**TEXT BOOKS**

1. S.D.Sharma, "Operations Research", Kedarnath & Ramnath Publisher, 15<sup>th</sup> edition, 2013.
2. J.K. Sharma, "Operations Research Theory & Applications", Macmillan India Ltd, 4<sup>th</sup> edition.

## REFERENCE

1. P.Sankara Iyer, “**Operations Research**”, Tata McGraw-Hill, 2008.
2. Taha, “**Operations Research**”, TMH, 2010.
3. A.M.Natarajan,P.Balasubramani,A.Tamilarasi, “**Operations Research**”, Pearson Education, 2005.
4. Hiller & Libermann, “**Introduction to Operations Research**”, McGraw Hill Publications, 9<sup>th</sup> Edition, 2010.

## E-RESOURCES

1. <http://www.mhhe.com/engcs/industrial/hillier/etext/PDF/chap03.pdf> (LPP)
2. <http://ocw.nctu.edu.tw/upload/classbfs121001503719748.pdf> (Transportation Problems)
3. [http://shodhganga.inflibnet.ac.in/bitstream/10603/19544/12/7\\_chapter%201.pdf](http://shodhganga.inflibnet.ac.in/bitstream/10603/19544/12/7_chapter%201.pdf) (Replacement Models)
4. <https://www.math.ucla.edu/~tom/GameTheory/mat.pdf> (Game Theory)
5. <http://www.ime.unicamp.br/~andreami/MS515/capitulo12.pdf> (Inventory Models)

## Course Outcomes:

After completion of the course students will be able to:

1. Find feasible solution to LPP by various Methods.
2. Minimize the cost and time by using Travelling salesmen Problem.
3. Understand the various concepts of Replacement model problems.
4. Solve the game theory problems.
5. Understand the various concepts of inventory models.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70B18</b>	<b>NANO MATERIALS (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objective:** The objective is to provide different methods of synthesis and characterization of nano materials.

**MODULE I: Physical Methods**

**10 periods**

Bottom-up approach and Top-down approach, Inert gas condensation, Arc Discharge, lasers ablation, laser pyrolysis, ball milling, molecular beam epitaxial, and electro deposition.

**MODULE II: Chemical methods**

**10 periods**

Nanocrystals by chemical reduction, photochemical synthesis, electrochemical synthesis, Nano crystals of semiconductors.

**MODULE III: Thermal Methods & Surface Characterization**

**10 periods**

**III A-Thermal Methods:**

Thermolysis route – spray pyrolysis and solvated metal atom dispersion, sol-gel method solvothermal and hydrothermal routes, solution combustion synthesis, CVD method.

**III B: Surface Characterization**

Scanning electron microscopy (SEM), Transmission electron microscopy (TEM). Photo luminescence Spectroscopy.

**MODULE IV: Compositional and structural Characterization techniques**

**09 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 Nano materials**

**09 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 Applications**” 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, 1<sup>st</sup> Edition, 2003
2. C Dupas, P Houdy, M Lahmani, Nanoscience: “**Nanotechnologies and Nanophysics**”, Springer-Verlag Berlin Heidelberg, 1st Edition, 2007
3. T Pradeep, “**NANO: The Essentials: Understanding Nanoscience and Nanotechnology**”, Tata McGraw-Hill Publishing 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\\_Lectures/Lecture4-Overney-NP-Synthesis.pdf](http://courses.washington.edu/overney/NME498_Material/NME498_Lectures/Lecture4-Overney-NP-Synthesis.pdf)
3. [https://www.ttu.ee/public/m/Mehaanikateaduskond/Instituudid/Materjalitehnika\\_instituut/MTX9100/Lecture11\\_Synthesis.pdf](https://www.ttu.ee/public/m/Mehaanikateaduskond/Instituudid/Materjalitehnika_instituut/MTX9100/Lecture11_Synthesis.pdf)
4. <http://www.materialstoday.com/nanomaterials/journals/>
5. <https://www.journals.elsevier.com/nanoimpact>
6. <http://www.springer.com/materials/nanotechnology/journal/12274>
7. <http://nptel.ac.in/courses/118104008/>
8. <http://nptel.ac.in/courses/118102003/>

#### **Course Outcomes:**

After completion of this 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 different compositional and structural characterization techniques.
5. Develop basic knowledge on the properties and applications of few nano materials

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70B19</b>	<b>NDT AND VACUUM TECHNOLOGY (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objective:** The objective is to provide a basic level of understanding on Non-destructive testing and Vacuum technology.

**MODULE I: Introduction to Non destructive testing** **10 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** **10 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** **10 Periods**  
**A: Introduction to Vacuum Technology**  
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**  
Molar flow, Mass flow and throughput; Rota meters and chokes; differential pressure techniques;

**MODULE IV: Pressure gauges** **09 Periods**  
Classification, Direct and indirect gauges, Indirect gauges – Pirani gauge, Thermocouple gauge, Ionization gauge, hot cathode gauge, Penning gauge

**MODULE V: Vacuum Pumps** **09 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

**REFERENCE BOOKS:**

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](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>
8. <http://nptel.ac.in/courses/112106138/22>

**Course Outcomes:**

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

1. Be aware of the concepts of NDT
2. Learn different methods of NDT.
3. Get Introduced to Vacuum technology and learn the concepts of flow meters.
4. Develop basic knowledge of pressure gauges.
5. Understand the concepts of different vacuum pumps.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70B21</b>	<b>NANO CHEMISTRY (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Prerequisites:** Nil

**Course Objective:** 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 in analyzing the nanomaterials. To make aware of the learners about different applications of nano materials.

**MODULE I : Nano Chemistry-I**

**08 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: Nano Chemistry-II**

**10 Periods**

Properties of nano materials-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: Principles involved in 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 Nano Tubes and Application**

**10 Periods**

Carbon Nano structures ,types and preparation of Carbon Nano tubes.Nano structured crystals. Graphene, Carbon nano-fibers- Carbon clusters and Fullerenes- optical and telecommunication applications.Organic Nano Solar cells and its applications.

**MODULE V: Environmental Nanotechnology**

**10 Periods**

Implications of Nanotechnology & Research needs-Nano structured Catalysts TiO<sub>2</sub> Nano particles for Water purification- Nano membranes in Drinking water treatment and desalination, Nano membranes 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 nano science and nanotechnology**”. Tata Mc.Graw Hill, New Delhi, 2007.



## REFERENCES:

1. A. K. Haghi, Ajesh K. Zachariah, Nandakumar Kalariakkal. “**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. Phani kumar. “**Principles of nanotechnology**”, Scitech Publications 2<sup>nd</sup> Edition, 2010.
4. Preeti jain, Shankar lal Garg. “**Environmental Nanotechnology**” Lap lambert Academic publishing , 2015.

## E RESOURCES

1. [www.docbrown.info/page03/nanochem02.htm](http://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](http://nptel.ac.in/courses/118104008/6) (Introduction to nanomaterials)
6. [nptel.ac.in/courses/118104008/](http://nptel.ac.in/courses/118104008/) (Nanostructures and nanomaterials)

## Course Outcomes

After completion of the course, students will be able to

1. Students will learn the different synthetic methods of the nano materials.
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 nano tubes, carbon nano fibers, nano structured catalysts and organic nano solar cells.
5. Students will learn usage of nano materials in the purification of water.

<b>2017-18 Onwards (MR-17)</b>	<b>MALLA REDDY ENGINEERING COLLEGE (Autonomous)</b>	<b>B.Tech.</b>		
<b>Code: 70B22</b>	<b>PHOTOCHEMISTRY AND SPECTROSCOPY (Open Elective)</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Credits: 3</b>		<b>3</b>	<b>-</b>	<b>-</b>

**Pre-requisite: Nil**

**Course Objective:** The objective is to make the students know about the impact of light on matter and the implications of it also to bring awareness to explore the consequences of light matter interaction. To give knowledge to the learners regarding the structural identification /determination utilizing the different regions of electromagnetic spectrum.

**MODULE I: Photochemistry I**

**10 Periods**

Introduction to photochemistry, atomic orbitals, molecular orbitals, thermal and photochemical reactions. Fundamental principles of photochemistry-Interaction of light with chemical substances. absorption spectra, electronic transition. spin multiplicity, singlet and triplet of excited state.

**MODULE II: Photochemistry II**

**10 Periods**

Laws of photochemistry - Grothuss-Draper law, Stark-Einstein law and Lambert-Beer Law. Quantum efficiency – determination. Jablonski Diagram-Fluorescence and Phosphorescence. Chemiluminescence and Thermoluminescence with examples. Photosensitization.

**MODULE III: Absorption Spectroscopy**

**10 Periods**

**A:** Introduction and importance; Principles and instrumentation; Interferences - Chemical & Spectral methods.

**B:** Applications of Atomic Absorption Spectroscopy for qualitative and quantitative analysis. UV-Visible spectroscopy: principles, applications for qualitative and quantitative analysis.

**MODULE IV: IR Spectroscopy**

**09 Periods**

Introduction- basic principles, Instrumentation. Identification of some functional groups applications for qualitative and quantitative analysis.

**MODULE V: Nuclear Magnetic Resonance Spectroscopy**

**09 Periods**

Introduction-basic principles, Instrumentation – chemical shift- Spin-Spin splitting- coupling constant, Spin decoupling, shift reagents. Structure determination, applications of proton NMR spectroscopy.

**TEXT BOOKS:**

1. Mohan Jag, “Organic spectroscopy: Principles and applications”, 2<sup>nd</sup> Edition, 2000.
2. R.O. Kan, “Organic Photochemistry”, McGraw-Hill series in advanced chemistry, New York, 1966.

**REFERENCES:**

1. J.Mendham, R.C. Denney, J.D. Barnes and M.J.K. Thomas, “Vogel’s Text Book of Quantitative Chemical Analysis”, Pearson Education Pvt. Ltd., New Delhi, 6<sup>th</sup> edition, 1999.
2. C.N. Banwell and E.M. Mc cash, “Fundamentals for molecular spectroscopy” 4<sup>th</sup> edition, 1994.
3. N.J Turro, “Modern molecular photochemistry”, The Benjamin/comings publishing 1991.

4. John R.Dyer , K.L. Rinehart, “**Applications of Absorption Spectroscopy of Organic Compounds**”, Prentice-Hall of India Pvt. Ltd., New Delhi, 1969.
5. Hobart H.Willard and D.U.Merritt & J.R.J.A, “**Instrumental Methods of Analysis**”, Dean, C.E.S Publishers and distributors, 1986.

### **E RESOURCES**

1. [photobiology.info/Ilichev.html](http://photobiology.info/Ilichev.html) (photochemistry theoretical concepts and reaction mechanisms)
2. [https://chem.libretexts.org/.../Spectroscopy/...Spectroscopy/Infrared\\_Spectroscopy](https://chem.libretexts.org/.../Spectroscopy/...Spectroscopy/Infrared_Spectroscopy) (IR spectroscopy)
3. [www.spectroscopynow.com/.../journal/sepspec1730journal/Spectroscopy-Europe-Ma](http://www.spectroscopynow.com/.../journal/sepspec1730journal/Spectroscopy-Europe-Ma) (Magazine)
4. Journal of spectroscopy ( Hindawi publishers)
5. [nptel.ac.in/courses/103108100/31](http://nptel.ac.in/courses/103108100/31) (Infrared spectroscopy)
6. <https://www.youtube.com/watch?v=o8zELwp358A> (UV-Visible spectroscopy)

### **Course Outcomes**

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

1. Aware about the light matter interaction.
2. Understand various law's of photochemistry such as Grotthuss-Draper, Stark-Einstein and Lambert-Beer law's.
3. Get knowledge about qualitative and quantitative analysis of various samples by Absorption spectroscopy.
4. Identify the functional groups in organic molecules by IR spectrum.
5. Acquire the knowledge of structural elucidation of organic molecules by proton NMR spectroscopy.